Department of Planning, Housing and Infrastructure

Our ref: MP11_0047-PA-83

Andrew Wright
Group Superintendent – Biodiversity
Tarrawonga Coal Pty Ltd

3/11/2025

Tarrawonga Coal Expansion – Offset Management Plan

Dear Mr Wright

Thank you for submitting the Offset Management Plan submitted in accordance with Condition 47, Schedule 3 of the consent for the Tarrawonga Coal Expansion (MP11_0047-PA-83). I also acknowledge your response to the Department's review comments and request for additional information.

I note the revised Offset Management Plan has been prepared in consultation with CPHR; and contains the information required by the conditions of approval.

Accordingly, as nominee of the Planning Secretary, I approve the revised Offset Management Plan (Rev, 4, October 2025).

You are reminded that if there are any inconsistencies between the Plan and the conditions of approval, the conditions prevail.

Please ensure you make the document publicly available on the project website at the earliest convenience.

If you wish to discuss the matter further, please contact Charissa Pillay.

Yours sincerely

Stephen O'Donoghue
Director
Resource Assessments
As nominee of the Planning Secretary

Australian Government
Department of Climate Change, Energy, the Environment and Water

EPBC 2011/5923

Mr Andrew Wright
Superintendent – Group Biodiversity
Whitehaven Coal Limited
231 Conadilly Street
Gunnedah NSW 2380

Approval of Offset Management Plan for Tarrawonga Coal Mine Extension Project, near Gunnedah, New South Wales

Dear Mr Wright

Thank you for your email dated 11 April 2025 to the Department of Climate Change, Energy, the Environment and Water (the department), seeking approval of a revision to the Offset Management Plan required under Condition 12 of the above project under the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act).

Officers of the department have advised me on the Offset Management Plan and the requirements of the conditions of the approval for this project. On this basis, and as a delegate of the Minister for the Environment and Water (the Minister), I have decided to approve the *Tarrawonga Offset Management Plan, Edition 2 Rev. 3, 11 April 2025*.

Now this revised plan has been approved, it must be implemented.

As you are aware, the department has an active monitoring program which includes monitoring inspections, desk top document reviews and audits. Please ensure that you maintain accurate records of all activities associated with, or relevant to, the conditions of approval so that they can be made available to the department on request.

Should you require any further information please contact Tony Dowd by email to PostApproval@dcceew.gov.au.

Yours sincerely

Kate Gowland
Branch Head
Nature Positive Regulation Division | Environment Assessments (NSW, ACT)
25 July 2025

From: Ben BAGHURST
To: Andrew Wright
Subject: RE: EPBC 2011/5923 - Tarrawonga OMP - Decision Letter [SEC=OFFICIAL]
Date: Friday, 24 October 2025 1:44:45 PM
Attachments: image001.png

OFFICIAL

Thanks very much Andrew.

We'll come back to you if we have any queries.

Have a great weekend.

Kind regards,

Ben

Ben Baghurst

OFFICIAL

From: Andrew Wright
To: Ben BAGHURST
Subject: RE: EPBC 2011/5923 - Tarrawonga OMP - Decision Letter [SEC=OFFICIAL]
Date: Friday, 24 October 2025 12:15:00 PM
Attachments: image001.png

OFFICIAL

Ben

Thank you for your team assisting to approve the Tarrawonga Offset Management Plan, Edition 2 Rev. 3, 11 April 2025.

In reviewing the Final (v2.3) version; it was identified that Figures 4.1, 4.2, 4.3, 4.4, 4.5 and 5.1 contain incorrect Offset boundaries so these Figures have been updated and these errors addressed in Final (v2.4) version attached.

WHC are submitting the revised Tarrawonga Offset Management Plan, Edition 2 Rev. 4, 22 October 2025 under Condition 34 of the EPBC Approval 2011/5923. The reason is that the revision is minor and administrative in nature resulting no new or increased impact to EPBC matters; therefore without needing to be submitted for

approval under s 143A of the EPBC Act. WHC will implement the revised Tarrawonga Offset Management Plan from the date of the plan and for the life of the EPBC Approval 2011/5923.

Regards

Andrew Wright
Group Manager Biodiversity

Whitehaven Coal Limited

Whitehaven

OFFICIAL

From: Tony Dowd
To: Andrew Wright
Subject: EPBC 2011/5923 - Tarrawonga OMP - Decision Letter [SEC=OFFICIAL]
Date: Monday, 28 July 2025 10:38 AM
Attachments: image001.png

OFFICIAL

Hi Andrew

Please see attached a letter from a delegate of the Minister for the Environment and Water, advising you of her decision regarding the *Tarrawonga Offset Management Plan, Edition 2 Rev. 3, 11 April 2025*.

Regards

Tony Dowd
Senior Assessment Officer | Post Approvals Section
Department of Climate Change, Energy, the Environment and Water

OFFICIAL

TARRAWONGA OMP 2025

(Offset Area approved for Tarrawonga Coal Mine MP 11_0047 and EPBC 2011/5923)

Prepared by Whitehaven Coal
ABN: 68 124 425 396

22 October 2025

Document History

Edition	Rev.	Comments	Author	Date
1	0	Initial draft of WHC BOMP to consolidate and standardise management requirements of subsidiary-owned WHC Biodiversity Offset Areas (Biobank, Kenna, Onsite, Werris and Willeroi) into one Management Plan following securement of Conservation Agreements CA0060, VCA0486, VC00528, VC00496, VC00530, VC00495, VC00529 and VC00531.	Ecoplanning Pty Ltd on behalf of Whitehaven Coal	10 March 2023
2	0	Revised draft of standalone Tarrawonga OMP for consultation with NSW DPHI, NSW DCCEEW, Forestry Corporation of NSW, Tarrawonga Coal Community Consultative Committee, NWLLS and Commonwealth DCCEEW following requested individual offset area management plans for each WHC Mining Operation. Where relevant, amendments have been made following consultation with the Biodiversity, Conservation and Science Group (BCS) of the NSW DCCEEW and BCT for the Vickery and Maules OMP to ensure consistency between documents.	Ecoplanning Pty Ltd on behalf of Whitehaven Coal	24 September 2024
2	1	Satisfaction of amendments to the Tarrawonga OMP received from the BCS Group of the NSW DCCEEW.	Ecoplanning Pty Ltd on behalf of Whitehaven Coal	10 October 2024
2	2	Revised draft responding to preliminary check assessment by Commonwealth DCCEEW.	Ecoplanning Pty Ltd on behalf of Whitehaven Coal	5 February 2025
2	3	Revised draft responding to NSW DPHI.	Ecoplanning Pty Ltd on behalf of Whitehaven Coal	1 April 2025
2	3	Final for submission	Ecoplanning Pty Ltd on behalf of Whitehaven Coal	11 April 2025
2	4	Final (v2.3) updated to rectify minor mapping boundary errors in Figures 4.1, 4.2, 4.3, 4.4, 4.5 and 5.1.	Ecoplanning Pty Ltd on behalf of Whitehaven Coal	22 October 2025

DECLARATION OF ACCURACY

In making this declaration, I:

a) am aware that section 491 of the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) makes it an offence in certain circumstances to knowingly provide false or misleading information or documents to specified persons who are known to be performing a duty or carrying out a function under the EPBC Act or the *Environment Protection and Biodiversity Conservation Regulations 2000* (EPBC Regulations). The offence is punishable on conviction imprisonment or a fine, or both.

b) am authorised to bind Whitehaven Coal to this declaration and have no knowledge of that authorisation being revoked at the time of making this declaration.

Signature

Full name (please print)

Andrew Wright (Group Superintendent - Biodiversity)'

Organisation (please print)

Whitehaven Coal Limited

Date: / /

CONTENTS

APPENDICES

FIGURES

TABLES

GLOSSARY AND ABBREVIATIONS

Acronym	Description
ASC	Australian Soil Classification
AWS	Automatic Weather Stations
BA	Biobanking Agreement
BBAM	Biobanking Assessment Method
BC Act	Biodiversity Conservation Act 2016
BCS	Biodiversity, Conservation and Science Group within NSW DCCEEW
BCT	Biodiversity Conservation Trust
BGW	Box Gum Woodland
BOA	Biodiversity Offset Area
BOMP	Biodiversity Offset Management Plan
BOS	Biodiversity Offset Strategy
CDCCEEW	Commonwealth Department of Climate Change, Energy, the Environment and Water (formerly Department of Agriculture, Water and the Environment [DAWE])
CEEC	Critically Endangered Ecological Community
DAWE	Former Commonwealth Department of Agriculture, Water and the Environment, now Commonwealth Department of Climate Change, Energy, the Environment and Water (CDCCEEW)
DNG	Derived Native Grassland
DPE	Former NSW Department of Planning and Environment, now NSW Department of Planning, Housing and Infrastructure (DPHI) and NSW Department of Climate Change, Energy, the Environment and Water (DCCEEW)
EEC	Endangered Ecological Community
ELA	Eco Logical Australia
EP	Ecoplanning
EP&A Act	NSW Environmental Planning and Assessment Act 1979
EPBC Act	Environment Protection and Biodiversity Conservation Act 1999
GBD	General Biosecurity Duty
GSG	Greater Soil Group
ha	Hectares
HTE	Hight Threat Exotic
IBRA	Interim Biogeographic Regionalisation for Australia
KTP	Key Threatening Process

Acronym	Description
LGA	Local Government Area
NPWS	NSW National Parks and Wildlife Service
NSW	New South Wales
NSW DCCEEW	NSW Department of Climate Change, Energy, the Environment and Water
NSW DPHI	NSW Department of Planning, Housing and Infrastructure (formerly Office of Environment and Heritage [OEH])
NWRSWMP	North West Regional Strategic Weed Management Plan 2017 – 2022
OEH	Former Office of Environment and Heritage, now NSW Department of Planning, Housing and Infrastructure (DPHI)
OMP	Offset Management Plan
PCT	Plant Community Type
RBOS	Revised Biodiversity Offset Strategy
RCM	Rocglen Coal Mine
RFS	NSW Rural Fire Services
SSD	State Significant Development
TCM	Tarrawonga Coal Mine
TEC	Threatened Ecological Community
VCM	Vickery Coal Mine
VZ	Vegetation Zone
WHC	Whitehaven Coal Limited
WoNS	Weeds of National Significance

EXECUTIVE SUMMARY

The Tarrawonga Offset Management Plan (OMP) has been prepared in accordance with the relevant State and Commonwealth approvals for Tarrawonga Coal Mine (TCM) and provides a plan for the management of WHC company-owned Biodiversity Offset Areas (BOA), approved for the TCM as documented in the Tarrawonga Revised Biodiversity Offset Strategy (AMBS, 2024).

This OMP describes the management methods to be applied to Willeroi West BOA (herein referred to as the BOA), that are based on standardised management actions utilised across all other WHC company-owned BOA properties, ensuring contemporary management methods are being applied effectively and efficiently to deliver the required ecological objectives of various OMPs and in accordance with the State and Commonwealth approval requirements for the BOA within this OMP.

Following submission of a consolidated WHC BOMP in 2023; this standalone OMP has not previously been submitted to the New South Wales (NSW) Department of Planning, Housing and Infrastructure (NSWDPHI), NSW Department of Climate Change, Energy, the Environment and Water (NSWDCCEEW) and to the Commonwealth Department of Climate Change, Energy, the Environment and Water (CDCCEEW), however, the following Biodiversity Management Plan (BMP) is currently approved for the management of biodiversity at the TCM WHC coal mine:

- Tarrawonga Coal Mine BMP (2020a and revised 2022), approved by NSW Department of Planning, Industry and Environment (DPIE, now known as NSWDPHI) on 14 December 2020 and revisions accepted 16 August 2022 and the CDCCEEW (formerly Department of Agriculture, Water and Environment [DAWE]) on 1 December 2020 and revisions accepted 16 August 2022) for TCM.

The approved Tarrawonga Coal Mine BMP has subsequently been updated (WHC 2025) to incorporate this OMP.

Further, this OMP has been prepared following the securement of the Conservation Agreement Willeroi CA0060, registered on 24 June 2021. The BOA incorporated the new requirements imposed by the Biodiversity Conservation Trust (BCT).

In accordance with the securement process with the BCT (under the *Biodiversity Conservation Act 2016*), WHC was required to complete additional cadastral surveys and contemporise the vegetation mapping of the BOA. The cadastral survey undertaken by registered surveyors involves redefining the cadastral boundary to a very high accuracy and resulted in variations to the previous extent of the Willeroi West BOA when compared to the lower accuracy digital cadastre spatial data that was used in mapping the originally approved BOA.

In addition, the BCT requires the use of the Plant Community Type (PCT) vegetation mapping classification system and therefore the existing Willeroi West BOA vegetation mapping (undertaken by Flora Search (2011) using an older classification system) has been contemporised utilising quantitative biometrics to define vegetation mapping required for PCT mapping (AMBS, 2024).

Both these processes were finalised in 2023 and therefore have been summarised and incorporated into this version of the OMP document; documenting the relevant changes to the originally approved BOA and/or approved but now superseded mapping of the vegetation communities.

This OMP will be finalised following consultation with stakeholders; the former NSW Biodiversity Conservation Division (now NSWDCCEEW), North West Local Land Services (NWLLS), TCM Community Consultative Committee (TCM CCC), Forestry Corporation of NSW and is to be approved by CDCCEEW and NSWDPHI. Upon its approval, this OMP will complement the 2025 updated *Tarrawonga Coal Mine BMP* (WHC, 2025) with the sections that are specific to onsite management retained but will supersede the relevant text in sections related to the BOA that are external and offsite

to TCM. This OMP also integrates the requirements of the Conservation Agreement CA0060 on 24 June 2021.

1 INTRODUCTION

1.1 BACKGROUND

Whitehaven Coal Limited (WHC) operates numerous coal mines within the Gunnedah Basin (**Figure 1.1**) including the Tarrawonga Coal Mine (TCM). This Offset Management Plan (OMP) has been prepared to address the requirements of State and Commonwealth approval (Project Approvals under the NSW *Environmental Planning and Assessment Act* [EP&A Act] as well as approval under the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* [EPBC Act] for TCM **(**shown in **Table 1.1**) and has been guided by the *EPBC Act Environmental Offset Policy* (DSEWPaC 2012). Details regarding the mine, its location, ownership and approvals are summarised in **Table 1.1** and legally binding conservation covenant for the BOA is documented in **Table 1.2**. The TCM included a now surrendered DA 88-4-2005 MOD1 Schedule 3 Condition 33 legacy offset requirement on the Yarrari/Belah BOA. This legacy offset requirement is not a part of the contemporary Major Project Approval BOS in MP 11_0047.

Table 1-1: WHC Mine Locations, Ownership and NSW/Commonwealth Approval details

Mine	Location	Owner	State (NSW) Approval	Commonwealth EPBC Approval
Tarrawonga Coal Mine (TCM)	Approximately 39 km north of Gunnedah and 15 km north-east of Boggabri in the north-west region of NSW	Tarrawonga Coal Pty Ltd (a wholly owned subsidiary of WHC).	MP 11_0047 MOD 9 (May 2021)	EPBC 2011/5923 (24 March 2021)

Table 1-2: Legally Binding Conservation Covenants relevant to the BOA

Mine	BOA	Offset Properties	Legally Binding Conservation Covenant
TCM	Willeroi West BOA	Willeroi	CA0060
TCM*	Yarrari/Belah BOA	Yarrari and Belah	Biobanking Agreement (BA) 43

TCM* - legacy offset requirement from surrendered DA 88-4-2005 MOD1 Schedule 3 Condition 33 that is not a part of the contemporary Major Project Approval BOS in MP 11_0047

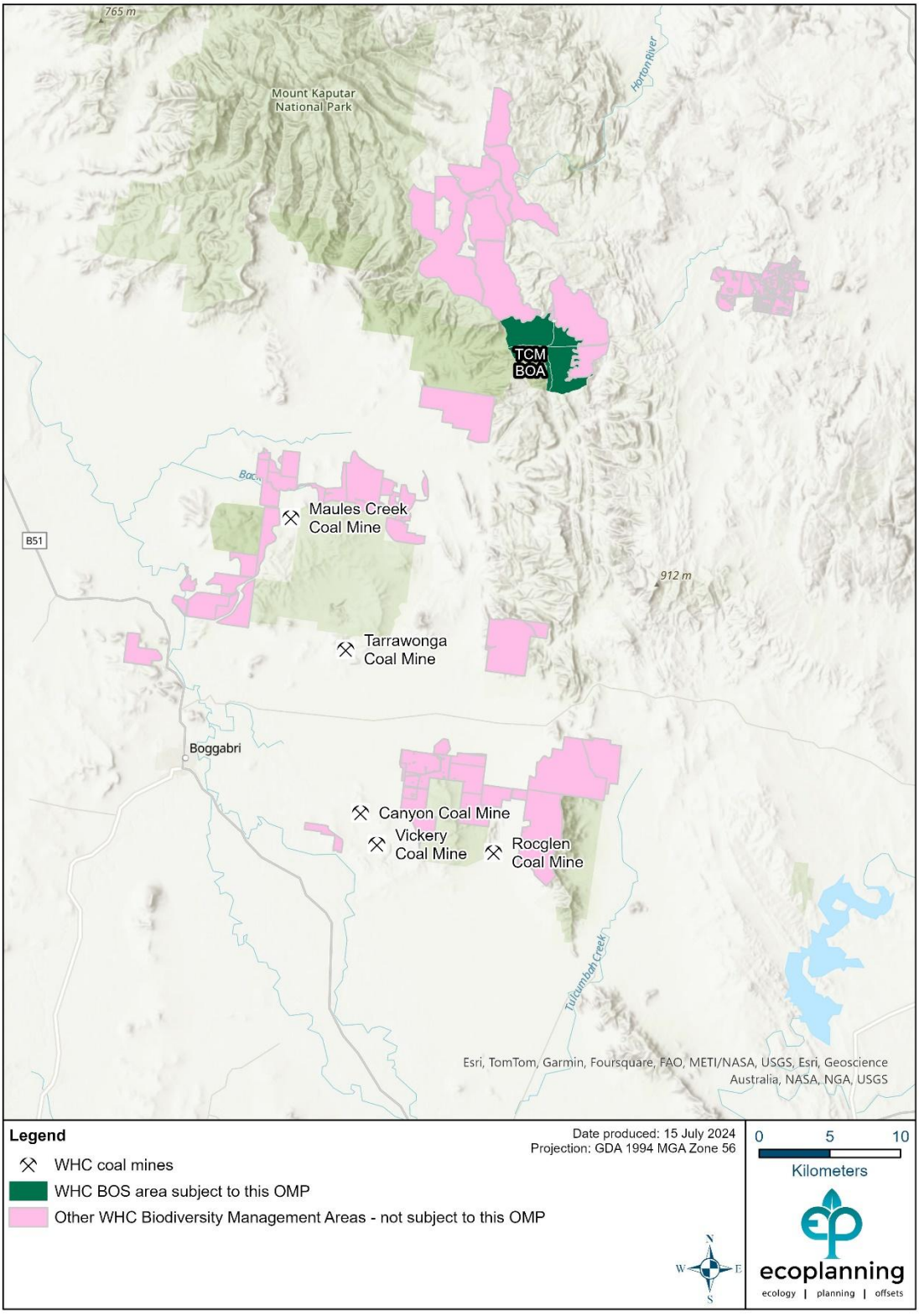

Figure 1.1: Regional setting of WHC coal mines and Biodiversity Offset Strategy (BOS) areas

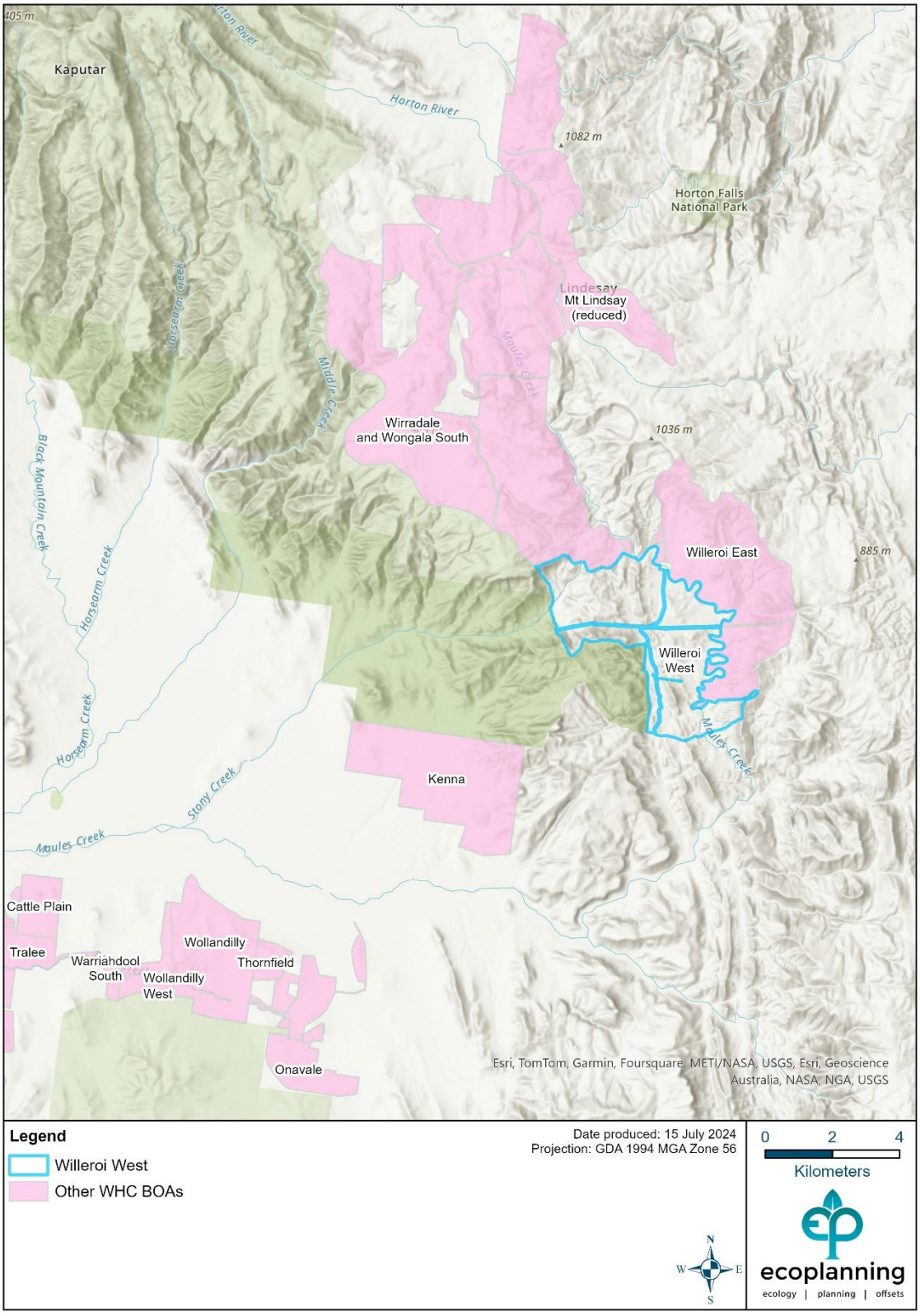

Figure 1.2: Regional setting of the BOA and offset properties

1.2 SCOPE

The purpose of this (OMP) is to provide a consolidated plan for the management of the BOA shown in **Figure 1.2**, in accordance with all relevant Approval requirements outlined in **Table 2-2** and **Appendix A – Appendix G,** and summarised in **Section 2.** This OMP will provide WHC direction to:

- Identify the land that will be required to be managed in accordance with this OMP;
- Outline the actions for managing biodiversity within the BOA;
- Identify and address approvals and legislative requirements relevant to biodiversity management of the BOA;
- Provide a management framework that will lead to an improvement in the condition of biodiversity across the BOA;
- Identify and minimise the impacts of key threats to biodiversity; and
- Outline the monitoring, performance evaluation and reporting processes to be implemented by WHC personnel.

Upon its approval, this OMP will complement the updated *Tarrawonga Coal Mine BMP* (WHC, 2025) with the sections that are specific to onsite management retained but will supersede the relevant text in sections related to the BOA that are external and offsite to TCM. This OMP also integrates the requirements of the Conservation Agreement CA0060 on 24 June 2021.

The sections of the updated BMP that have been superseded or replaced by this OMP are outlined below in **Table 1.3**. All text or sections related to mine site rehabilitation areas within the *Tarrawonga Coal BMP* (WHC, 2025) (Sections 1, 2, 3, 4, 7 and 8) are still relevant to biodiversity management of TCM and are not being superseded by this OMP. WHC has centralised the biodiversity management of the external BOAs that are separate to Mine Sites and this OMP is intended to be consistent with other WHC OMPs that have been contemporarised in preparation to achieve streamlined management approach for all external BOAs going forward.

Table 1-3: Sections of the previously approved BMP to be superseded by this OMP

Previously approved BMP	Sections of previously approved BMP to be replaced/superseded	Relative section of this OMP
Tarrawonga Coal Mine Biodiversity Management Plan (WHC, 2022)	Section 5: Existing Environment Relevant to the Offset Areas	Section 3: Existing Environment Relevant to the Offset Areas
	Section 6: Management of Willeroi West Offset Area	Section 4: Management of Biodiversity Offset Areas
	Section 7: Potential Risks and Contingency Measures (as relevant to the BOA)	Section 4.17: Potential Risks and Contingency Measures
	Section 8: Reporting and Review (as relevant to the BOA)	Section 5: Reporting and Review

1.3 STRUCTURE OF THE OFFSET MANAGEMENT PLAN

The structure of this plan is as follows:

Section 2 Requirements for the Offset Management Plan

Section 3 Description of the Existing Environment Relevant to the BOA

Section 4 Description of each BOS and Securement

Section 5 Description of the Management Actions to be undertaken within the BOA and description of Potential Risks and Contingency Measures

Section 6 Description of Reporting and Review Requirements

The following are appended to this OMP:

Appendix A Tarrawonga Coal Mine relevant State approval requirements

Appendix B Leard Forest Regional Biodiversity Strategy Stage 2 – Strategy Report (Umwelt, 2017) requirements

Appendix C Key Biometric Annual Performance Criteria for relevant Keith Classes

Appendix D Offset Risk Assessment

Appendix E Willeroi West Flora Monitoring Plots

Appendix F Willeroi West Fauna Monitoring – Survey Co-ordinates

Appendix G Willeroi West Baseline Condition Report

1.4 CONSULTATION

The stakeholders outlined in **Table 1.4** will be formally consulted in the preparation of the OMP as per Major Project (MP) 11_0047 Approval; which is to be finalised following approval from Commonwealth Department of Climate Change, Energy, the Environment and Water (CDCCEEW) (formerly the Commonwealth Department of Agriculture, Water and the Environment [DAWE]) and NSW Department of Planning, Housing and Infrastructure (NSWDPHI) (formerly DPE).

Consultation by WHC was initially undertaken for the Vickery OMP with the Biodiversity, Conservation and Science Group (BCS) of the NSW Department of Climate Change, Energy, the Environment and Water (NSW DCCEEW). To ensure consistency between WHC OMP documents, these comments, where relevant, have been incorporated into the Tarrawonga OMP. The revised Tarrawonga OMP was submitted to the BCS of NSW DCCEEW on 27 September 2024, with the BCS noting that the Tarrawonga OMP is consistent with the OMPs prepared for Vickery and Maules Creek mines on 17 October 2024.

Table 1-4: Stakeholders to be consulted in preparation of this OMP

Stakeholder
NSW DPHI – consulted 29 November 2024 and responded 10 March 2025 with requested revisions provided 1 April 2025
CDCCEEW – consulted 10 October 2024 and responded 20 January 2025 with requested revisions provided 1 April 2025
NSW Department of Climate Change, Energy, the Environment and Water (NSWDCCEEW), formerly Office of Environment and Heritage (OEH) now North West - Biodiversity, Conservation & Science (BCS) – consulted 27 September 2024 and responded 17 October 2024 agreeing that previous comments had been largely incorporated and the RBOS was consulted 16 July 2024 and responded 31 July 2024 with no further comment
Forestry Corporation of NSW – consulted 10 October 2024 and responded 15 October 2024 with no further comment.
TCM Community Consultative Community (CCC) – consulted 28 August 2024 and 15 October 2024 with no further comment
NWLLS – consulted 4 July 2024 and responded 4 July 2024 with no further comment

1.5 RESPONSIBILITIES

WHC is responsible for managing, monitoring, implementing and reviewing the management activities specific to the BOA covered by this OMP. **Table 1.5** outlines the key positions and contractors involved with implementing the offset management activities in this OMP (at the time of writing).

Table 1-5: Details of all parties responsible for management, monitoring and implementing the management activities associated with the Tarrawonga BOA

Area	Organisation*	Position*	Status*	Responsibilities*
WHC Biodiversity Offset Areas	WHC	Group Manager/ General Manager	Employee	Obtain and provide adequate resources for the Group Superintendent - Biodiversity to implement the OMP.
	WHC	Group Superintendent - Biodiversity	Employee	To authorise this OMP and undertake associated compliance and reporting requirements. Implement the overall biodiversity strategy on the offset areas; coordinate and supervise biodiversity management and monitoring activities on the offset areas. Initiate review of this OMP.

Area	Organisation*	Position*	Status*	Responsibilities*
	WHC	Biodiversity Specialist & Field Officers	Employee	Support the Group Superintendent - Biodiversity and supervise biodiversity management and monitoring activities on the offset areas.
	Pest Management Consultant/ Contractor	Scientists & Field Technicians	Contractors	Undertake biodiversity management activities as directed by the Group Superintendent - Biodiversity and Biodiversity/Field Officers for feral and pest animal monitoring and management/control.
	Land Management & Weed Spraying Contactor	Field Operators & Technicians	Contractors	Undertake biodiversity management activities as directed by the Group Superintendent - Biodiversity and Biodiversity/Field Officers for weed spraying, habitat augmentation, threatened species, revegetation ground preparation and other minor earthworks and waste/infrastructure removal plus tree planting and maintenance activities.
	Fire & Ecological Burn Contractor	Fire Fighters & Controlled Burn Practitioners	Contractors	Undertake biodiversity management activities as directed by the Group Superintendent - Biodiversity and Biodiversity/Field Officers for fire management planning, hazard reduction management and ecological burn implementation.
	Ecological Consultant	Ecologists	Contractors	Undertake monitoring as directed by the Group Superintendent - Biodiversity and Biodiversity/Field Officers for threatened species and ecological community assessment and flora/fauna surveys.
NCM Offset Areas Key Contact / Emergency Contact				
Attention: Whitehaven Group Superintendent - Biodiversity biodiversity@whitehavencoal.com.au and 0488 407 000				

* Roles/responsibilities can vary over time by Whitehaven based on ongoing performance, compliance and commercial aspects that change as required.

1.6 RELATIONSHIP WITH OTHER MANAGEMENT PLANS

Rehabilitation Management/ Plans and Strategies

As outlined in **Section 1.2,** this OMP does not prescribe management of biodiversity within mine site rehabilitation areas of TCM. This OMP complements the existing documents that describe rehabilitation and biodiversity management on each respective mine sites, so that collectively WHC are implementing integrated strategies for restoration of both mine site rehabilitation and BOS. Further, the following approved plans outline the specific management of mine site rehabilitation areas that is to be undertaken by the responsible parties on the mine site outlined within the following document:

- *Tarrawonga Coal Mine Mine Site Rehabilitation Plan* (WHC, 2020b) and *Rehabilitation Management Plan* (WHC, 2022b)

Revised Biodiversity Offset Strategy

The Revised Biodiversity Offset Strategy (RBOS) (AMBS 2024a; **APPENDIX H:**) updates the original BOS and its required biodiversity values, first described in MP 11_0047. The RBOS provides details on the BOA and the improved biodiversity outcomes compared to the original BOS requirements. This OMP outlines the management within the BOA as described in the RBOS.

Threatened Species and Box Gum Woodland Implementation Plans

The *TCM Threatened Fauna Implementation Plan* (WHC, 2015a) and *TCM Box-Gum Woodland Endangered Ecological Community Implementation Plan* (WHC, 2015b) have been prepared by WHC in accordance with Conditions 43 and 45 of Schedule 3 to PA 11_0047 for the BOA. These implementation plans were approved by NSW Department of Planning, Industry and Environment (DPIE, now known as DPHI) on the 14 January 2015.

The *TCM Threatened Fauna Implementation Plan* (WHC, 2015a) was developed to maximise the likely prospects for the provision of suitable habitats for threatened fauna on the offset area and on the post mining landform (including threatened species referred to in Condition 44 of Schedule 3 to PA 11_0047). The implementation plan requires 15 individual actions relating to the TCM Biodiversity Offset Strategy which have been included as part of this OMP, as per the requirements of Condition 45c and 48c of Schedule 3 to PA 11_0047. A review of this plan was undertaken by AMBS in 2024 as several regulatory and legislative changes have occurred since the finalisation of the *TCM Threatened Fauna Implementation Plan* (WHC, 2015a). As a result, a supplementary report has been prepared by AMBS (2024c) which focuses on factors concerning the TCM Offset Areas and includes 2 additional actions which inform this OMP. This report is included in the Tarrawonga Coal Mine BMP (Appendix C).

The *TCM Box-Gum Woodland Endangered Ecological Community Implementation Plan* (WHC, 2015b) was developed to maximise the prospects for rehabilitation and regeneration of the White Box – Yellow Box – Blakely's Red Gum Grassy Woodland and Derived Native Grassland (Box-Gum Woodland) (listed as a Critically Endangered Ecology Community [CEEC] under the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) and NSW *Biodiversity Conservation Act 2016* [BC Act]) on the offset area and the mine site. The implementation plan requires 39 individual actions relating to the Biodiversity Offset Strategy which have been included as part of this OMP, as per the requirements of Condition 43d and 48c of Schedule 3 to PA 11_0047. A review of this plan was undertaken by AMBS in 2024 as several regulatory and legislative changes have occurred since the finalisation of the *TCM Box-Gum Woodland Endangered Ecological Community Implementation Plan* (WHC, 2015b). As a result, a supplementary report has been prepared by AMBS (2024b) which focuses on factors concerning the TCM Offset Areas and includes 16 additional actions which inform this OMP. This report is included in the Tarrawonga Coal Mine BMP (Appendix B).

These approved implementation plans are incorporated into this OMP for the BOA.

2 REQUIREMENTS FOR THE BIODIVERSITY OFFSET MANAGEMENT PLAN

This OMP has been prepared in accordance with the latest modification of the State and Commonwealth approval documents, for TCM outlined in **Section 1**. Each section of this OMP addresses the conditions of the approval documents as outlined in **Table 2.1**. The approval decision requirements for EPBC 2011/5923 are outlined in **Table 2-2**. NSW state requirements are included in **APPENDIX A:**

Table 2-1: Approval document conditions addressed within each section of this OMP

OMP Section Cross Referenced to applicable condition of Approval documents	MP 11_0047	EPBC 2011/5923
Consultation Section 1.4	47a	N/A
Responsibilities Section 1.5	47g	13f
Relationship with other Management Plans Section 1.6	43b, 43c, 43d, 45a, 45c & 48c	N/A
Leard Forest Mining Precinct Regional Biodiversity Strategy Section 2.1	48b	N/A
BOS Section 4	40, 43a, 44, 46 & 49	6, 10, 13a, 13b & 13g
Management of Biodiversity Offset Areas Section 5	47b	13d
Ecological Management Objectives Section 5.1	N/A	13c
Biodiversity Offset Area Establishment Section 5.2	S3C 47d	N/A
Seed Management Section 5.3	S3C 47d	N/A
Revegetation Section 5.4	S3C 47d	N/A
Ecological Thinning Section 5.5	S3C 47d	N/A
Habitat Augmentation Section 5.6	S3C	N/A
Management of Heritage Values Section 5.7	S3C 47d	N/A
Weed Management Section 5.8	S3C 47d	13e iv
Pest Animal Management Section 5.9	S3C 47d	N/A
Erosion Control Section 5.10	S3C 47d	N/A
Bushfire Management Section 5.12	S3C 47d	N/A
Vegetation and Habitat Monitoring Section 5.13	S3C 47e	13b vi, 13e i, 13e ii
Fauna Monitoring Section 5.1.4	S3C 47e	13b vi

OMP Section Cross Referenced to applicable condition of Approval documents	MP 11_0047	EPBC 2011/5923
Performance and Completion Criteria Section 5.15	S3C 47b 47c 47e	13e iii
Potential Risks and Contingency Measures Section 5.16	S3C 47f	13e v
Reporting and Review Section 6	N/A	13e vi

S = Schedule of Major Project Approval; C = Condition Number within relevant Schedule (if applicable)

Table 2-2: Approval Decision EPBC 2011/5923 Requirements

Condition Number	Requirement	Relevant OMP Section
6	*The person taking the action must register a legally binding conservation covenant over offset areas of no less than:* *a. 1055 ha of an equivalent or better quality of habitat for the regent honeyeater;* *b. 397 ha of an equivalent or better quality of habitat for the swift parrot;* *c. 1355 ha of an equivalent or better quality of habitat for the greater long-eared bat; and* *d. 232 ha of an equivalent or better quality of the White Box-Yellow Box-Blakely's Red Gum Grassy Woodland and Derived Native Grassland ecological community.* *Note: Offset areas described in condition 6 do not necessarily need to be separate if the same areas can meet the listing criteria for the EPBC listed threatened species or communities as defined in the EPBC listing advice for that threatened species or community and meet the requirements of condition 6.*	Section 4.1 addresses the Biodiversity Offset Strategy and minimum area requirements. Section 4.2 addresses offset securement. Figure 4.2 displays areas of the White Box Yellow Box Blakely's Red Gum Grassy Woodland and Derived Native Grassland ecological community within the offset. Figure 4.3 displays Regent Honeyeater Habitat within the offset. Figure 4.4 displays Swift Parrot habitat within the offset. Figure 4.5 displays Greater Long-eared Bat habitat within the offset. These items are also addressed in the TCM RBOS (AMBS 2024a; APPENDIX H:)
9	*The offset areas must be of an overall equivalent or better quality than the areas being cleared. This means:* *(a) For White Box – Yellow Box – Blakely's Red Gum Grassy Woodland and Derived Native Grassland ecological community, offset areas must meet the definition of the ecological community described in the listing advice, and must be of an overall equivalent or better condition class than the areas being cleared, based on the proportion of each condition class represented and other relevant ecological attributes;*	Section 4.1 addresses the Biodiversity Offset Strategy and minimum area requirements. Table 4-1 indicates how these requirements have been met.

Condition Number	Requirement	Relevant OMP Section
	(b) For the threatened species, the quality of the habitat for the species, taking account of its ecological requirements, must be equivalent to or better than the areas being cleared.	
10	*The mechanism/s for registering a legally binding covenant must provide protection for the offset areas in perpetuity and be registered by 30 June 2021 or as otherwise approved by the Minister in writing.* *Evidence of registration must be provided to the Department within one month of registration of each legally binding covenant.* *The approval holder must report on progress meeting this requirement in each annual compliance report required under condition 32 and as otherwise requested by the Department.*	Section 4.1 addresses the establishment of the Willeroi West BOA, and Section 4.2 discusses offset securement. These items are also addressed in the TCM RBOS (AMBS 2024a; APPENDIX H:)
11	*If the person taking the action proposes to undertake any action within areas secured under condition 6, other than those management activities related to managing the offset areas or as set out in the conditions of approval, then approval to undertake that action must be approved in writing from the Minister. In seeking the Minister's approval, the person undertaking the action must provide a detailed assessment of the area where the action is proposed to take place and an assessment of all associated adverse impacts on matters of national environmental significance. If the Minister agrees to the action within the offset areas, the area identified for the action must be excised from the offset area and alternative offsets secured by the person taking the action at a ratio of at least 20:1 in relation to the impact on matters of national environmental significance.*	Section 6.3 details the procedure for the review and revision of the offset management plan.
12	*The person taking the action must submit to the Minister for approval an Offset management plan for all of the offset areas, specified in condition 6, within 12 months of the date of this approval. The approved Offset management plan must be implemented.* *Note: for consistency, the proponent may develop a Biodiversity Management plan that includes the requirements set for managing offsets and set out in these conditions, to align with the requirements of the NSW state government Project Approval dated 22 January 2013 (application number 11_0047) and this approval.*	This OMP will be submitted to the Minister for approval.
13	*The Offset management plan must include, but not be limited to, the following:* *a) a text description and map which clearly defines the location and boundaries of the offset areas. This must be accompanied by the offset attributes and shapefiles;*	Section 1.1 details the property within the BOA. Also see Figure 1.1 and Figure 1.2, showing the location and boundaries.
	b) a description of the methodology and results of surveys measuring the baseline ecological conditions in the offset areas. This must be consistent with the State and Transition Model and include but not be limited to: *i. the extent and condition of all vegetation communities, including a description of the structure, floristics and tree age class representation of each community;*	The baseline condition report detailing methodology and results is in APPENDIX G: Section 4.3 and Figure 4.1 details the vegetation communities mapped within the offset area.
	ii. the extent and condition class of all areas of the White Box—Yellow Box— Blakely's Red Gum Grassy Woodland and Derived Native Grassland ecological community;	Section 4.1, along with Figure 4.2 and Table 4-1, detail the extent and condition of White Box—Yellow Box— Blakely's Red Gum Grassy Woodland and Derived Native Grassland ecological community.

Condition Number	Requirement	Relevant OMP Section
	iii. surveys targeting the regent honeyeater, swift parrot and greater long-eared bat;	The baseline condition report detailing methodology and results is in APPENDIX G:
	iv. the extent and quality of all areas of habitat for the Regent Honeyeater, Swift Parrot and Greater Long-eared Bat;	Section 4.1, along with Table 4-1, Figure 4.3, Figure 4.4 and Figure 4.5, details the extent and quality of all areas of habitat for the Regent Honeyeater, Swift Parrot and Greater Long-eared Bat.
	v. the location of all survey sites (including co-ordinates);	Flora and fauna monitoring locations are detailed in APPENDIX E: and APPENDIX F:
	vi. photo reference points at survey sites.	Flora monitoring locations (including photo points) are detailed in APPENDIX E:
	c) clearly defined ecological management objectives for the offset areas;	Section 5.1 details ecological management objectives for the offset area.
	d) detailed description of all ecological management activities proposed to be undertaken, including maps and/or diagrams showing areas to be managed and the timing of the proposed activities;	Section 5 details the management activities proposed, including: Section 5.3 which details the Biodiversity Offset Area Establishment. Section 5.4 which details Seed Management Section 5.5 which details Revegetation Section 5.6 which details Ecological Thinning Section 5.7 which details Habitat Augmentation Section 5.8 which details Heritage Management Section 5.9 which details Weed Management Section 5.10 which details Pest Animal Management Section 5.11 which details Erosion Management Section 5.12 which details Agriculture Management

Condition Number	Requirement	Relevant OMP Section
		Section 5.13 which details Bushfire Management
	e) details of ongoing ecological monitoring programs, performance criteria, targets and provisions for adaptive management, including but not limited to: *i. a set of measurable ecological indicators for detecting changes to the White Box—Yellow Box—Blakely's Red Gum Grassy Woodland and Derived Native Grassland ecological community, including those that may be ascribed to ongoing water stress;*	Section 5.14 discusses flora monitoring within the BOA and Section 5.16 discusses performance and completion criteria
	ii. a monitoring plan to assess the success of the management activities measured against the baseline condition. The monitoring must be statistically robust and able to quantify change in the condition of the White Box—Yellow Box—Blakely's Red Gum Grassy Woodland and Derived Native Grassland ecological community and habitat for the regent honeyeater, swift parrot and greater long-eared bat. This should include the use of control sites and periodic ecological surveys to be undertaken by a qualified ecologist;	Section 5.14 discusses the flora monitoring program and design within the BOA
	iii. a list of performance criteria based on the ecological management objectives for the White Box—Yellow Box—Blakely's Red Gum Grassy Woodland and Derived Native Grassland ecological community and habitat for the regent honeyeater, swift parrot and greater long-eared bat;	Section 5.16 discusses performance and completion criteria for vegetation zones within the BOA.
	iv. measures to exclude weeds from all offset areas for the period covered by this approval;	Section 5.9 discusses the weed management program within the BOA, including seasonal weed assessment programs.
	v. a description of the potential risks to successful management against the performance criteria, and a description of the contingency measures that would be implemented to mitigate against these risks;	Section 5.17 discusses potential risks and contingency measures
	vi. a process by which to report to the Department the progress of management activities undertaken in the offset areas and the outcome of those activities, including identifying any need for improved management and activities to undertake such improvement.	Section 6.2.3 discusses the Commonwealth EPBC approval annual compliance reporting.
	f) details of all parties responsible for management, monitoring and implementing the management activities, including their position or status as a separate contractor.	Section 1.5 and Table 1-5 detail the persons responsible for implementation of the OMP, including management and monitoring activities.
	g) details of the funding requirements for the ongoing management activities, including an estimate of the costs of the activities and details of the parties responsible for funding the activities.	Section 5.3.5 discusses the BOA conservation bond.
14	*Unless otherwise agreed to in writing by the Department, the baseline surveys for threatened species must be conducted in accordance with the department's Survey Guidelines for Australia's Threatened Birds and the Survey Guidelines for Australia's Threatened Bats. Subsequent monitoring must be carried out annually at the same time of year as the baseline surveys, unless otherwise agreed to in writing by the Department.*	The baseline condition report detailing methodology and results is in APPENDIX G:. Section 5.15 discusses fauna monitoring within the BOA.

2.1 LEARD FOREST MINING PRECINCT REGIONAL BIODIVERSITY STRATEGY

The requirements of the *Leard Forest Regional Biodiversity Strategy Stage 2 – Strategy Report* (RBS- 2) (Umwelt, 2017) Tables 2.1-2.4 have been incorporated into this OMP (see **APPENDIX B**:). The RBS-2 was intended to provide a strategic framework for the management and implementation of the biodiversity offset programs already established by the Leard Forest Mining Precinct (Boggabri Coal, Tarrawonga Coal and Maules Creek Coal Mines) and to provide guidance for co-ordinated management with other land managers within the precinct area.

2.2 RELEVANT ENVIRONMENTAL MANAGEMENT PLAN GUIDELINES

This OMP was prepared in consideration of the *Environmental Management Plan Guidelines* (Cth DCCEEW, 2024). The relevant environmental management plan guidelines are presented in **Table 2-3**.

Table 2-3: Environmental Management Plan Guidelines

Guideline	Relevant OMP Section
GENERAL PRINCIPLES FOR THE PREPARATION OF AN ENVIRONMENTAL MANAGEMENT PLAN	
Key principles	
An environmental management plan should:	
• *be balanced, objective and concise*	Throughout this OMP
• *state any limitations that apply, or should apply, to the use of the information in the environmental management plan*	None
• *identify any matter in relation to which there is a significant lack of relevant information or a significant degree of uncertainty*	None
• *include adaptive management strategies for managing uncertainty*	Section 5.17
• *be written in a way that is easily understood by other parties*	Throughout this OMP.
• *clearly present how conclusions about risks have been reached*	Section 5.17 and APPENDIX D:
• *ensure that the person taking the action takes full responsibility for the content and commitments contained in the plan.*	Section 1.5
Including commitments in management plans	
• *All commitments must be specific and auditable with measurable outcomes and clear timeframes.*	Throughout this OMP
• *To ensure readability, write clearly and avoid long sentences with complex clauses.*	
• *Always use the terms 'will' and 'must', rather than 'should' or 'may' when committing to carry out management actions.*	
• *Avoid use of ambiguous terminology such as 'where possible', 'as required', 'to the greatest extent possible'. If it is necessary to include ambiguous terminology, it should be explained and examples given.*	
• *Clearly explain any technical terms or acronyms used, and/or define them in a glossary.*	
It is also important that commitments or statements within the management plan are consistent with other relevant management plans or conditions of approval.	
Cross-referencing	
Where the plan refers to material in other documents, it should include cross-references that are clear, complete and that specify the document version and date. Use tables, diagrams and maps where their inclusion would provide a better understanding and implementation of the management plan. Link all tables, diagrams and maps into the text through cross-referencing.	Throughout this OMP and Section 7
CONTENT OF THE ENVIRONMENTAL MANAGEMENT PLAN	

Guideline	Relevant OMP Section
Cover page and declaration of accuracy	
Cover page detailing: • *EPBC number* • *project name* • *proponent /approval holder and ACN or ABN* • *the proposed/approved action* • *location of the action* • *date of preparation of the environmental management plan*	Cover Page
• *person accepting responsibility for the environmental management plan – signed declaration (see below).*	p. ii
Document version control	
The document version control should be a simple system that ensures that details of all key changes to the document over time are properly recorded. Identified changes should include details of timings, persons responsible and reasons for changes.	Document History Table (Page i)
Table of contents	
Table of contents page detailing: • *all section headings and page numbers* • *all figures, tables, plans and maps (should be numbered)* • *all appendixes (with meaningful titles, including for sub-appendixes if any). If the appendixes contain a collation of data, include summary of the contents.*	Table of Contents (Page ii – vi).
Executive summary or introduction	
The executive summary should note the key elements of the project, the purpose of the document, the main potential impacts and the primary strategies planned to address these impacts.	Section 1
Conditions of approval reference table	
When an environmental management plan is prepared after the project has been approved under the EPBC Act, the management plan should include a table detailing the information noted below:	
• *The EPBC Act approval condition requirements the plan is intended to address. These are best presented broken down into each of the individual actions that the conditions require.*	APPENDIX A:
• *The section and page numbers which address the approval conditions.*	Table 2-2
• *A summary of the key commitments relating to each of the approval conditions.*	Section 5.16
Project description	
The environmental management plan should provide a description of the project as this provides context for the plan. The location of all project actions should be described and a map showing their location provided. Basic information on the environment at these locations should also be included as this helps provide the environmental context to which the environmental management plan applies. The plan should include a description of the activities that will be undertaken as part of the project including project details relevant to any approval conditions and with potential impacts on matters protected under the EPBC Act. The plan should distinguish between construction and operational activities, if relevant. A schedule of intended commencement and completion dates should be provided. Projects undertaken in stages should identify each stage in the schedule. Contingency schedules can also be included along with examples of events that could result in the use of the contingency schedules.	Section 1
Objectives	
The environmental outcomes of the plan should be defined. These should be tailored to the environmental issues outlined in the plan.	Section 6
Environmental management roles and responsibilities	

Guideline	Relevant OMP Section
Once an action is approved, the approval holder is responsible for complying with the conditions of approval, including the commitments made in environmental management plans. The plan should define the roles and responsibilities of personnel in charge of the environmental management of the project. The roles and responsibilities of each relevant position should be documented, including the responsibilities of subcontractors. The names of the responsible personnel do not need to be included. Identification of the position titles, roles and responsibilities is sufficient. If the roles and responsibilities are expected to change over time the long-term variations should also be documented.	Section 1.5
Reporting	
An environmental management plan will usually require reporting arrangements for two purposes. Reporting arrangements assist with effective implementation and with external reporting. External reports may include reports on environmental incidences to the regulator, reports to stakeholders, reports to inform reviews of the plan and reports to meet the reporting requirements of the conditions of approval. *The description of reporting requirements should include:* • *a list of required reports including where appropriate monitoring, environmental incidents, non-compliance, corrective action and auditing* • *a description of the standard report content* • *the schedule or triggers for preparing a report* • *who the report is provided to* • *document control procedures.* *Reporting commitments should also be consistent with any reporting to us required by the conditions of approval.*	Section 6
Environmental Training	
All people involved with the project should receive relevant environmental training to ensure they understand their responsibilities when implementing the environmental management plan. People to be trained include those at the site/s of all project activities and operations, including contractors, subcontractors and visitors. The training should be tailored to the role of the individual in the project. *The environmental management plan should describe the training to be implemented and could include:* • *site inductions* • *identification of key points of environmental value and any relevant matters of national environmental significance* • *understanding the requirements of the environmental management plan and the individual's role* • *environmental incident emergency response procedures* • *site environmental controls* • *an outline of the potential consequences of not meeting their environmental responsibilities.* *Records of all training conducted should be maintained and include:* • *the person receiving the training* • *the date the training was received* • *the name of the person conducting the training* • *a summary of the training.*	Section 6.5
Emergency contacts and procedures	
The environmental management plan should identify the key emergency contacts responsible for managing environmental emergencies associated with the project and their contact details. These personnel should have the power to stop and direct works so that they can manage emergencies effectively. In addition, the plan should establish procedures for managing environmental emergencies and ensure that those procedures are implemented and maintained.	Section 1.5
Potential environmental impacts and risks	
Threats to matters protected under the EPBC Act *The environmental management plan should summarise all the identified threats to matters protected under Part 3 of the EPBC Act in the management plan. The matters protected by the EPBC Act include:*	Section 1.6 Section 5.17

Guideline	Relevant OMP Section
• *the 9 matters of national environmental significance (listed in Appendix A)* • *the environment in general (for actions by Commonwealth agencies or actions on Commonwealth land) or the environment on Commonwealth land (for actions outside Commonwealth land).*	
The plan should refer to relevant information provided in the EPBC Act assessment documentation, such as an environmental impact statement or preliminary documentation. If the project has already been approved, the plan should detail all new information relevant to the conditions placed on the approval. The key sensitivities of the environmental values potentially impacted by the action should be identified.	
Potential impacts *The potential impacts section of the plan should focus on identifying, locating and quantifying the potential impacts (direct and indirect) of the project on the matters protected by the EPBC Act. It should discuss:* • *the relevant impacts of the project* • *the nature and extent of the potential short-term and long-term effects* • *any uncertainties regarding the predicted impacts.*	
This may include a summary of any relevant information previously provided in assessment documentation, such as an environmental impact statement or preliminary documentation.	
Impacts from relevant stages of the action (for example, pre-construction, construction and operation) should be delineated in this section and should reflect the relevant conditions of approval. It may be necessary to divide the potential impacts into subsections reflecting the stages of the project.	
Risk assessment *Once the potential impacts of the proposal are clearly identified a risk assessment should be undertaken for each potential impact. This means that the likelihood and consequences of each potential impact need to be estimated. An example of a methodology for risk assessment is at Evaluating risk.* *The function of the risk assessment is not to repeat or supersede the original assessment of a project or its conditions of approval. Rather it is to ensure that these risks are effectively translated into actual mitigation and management actions. Impacts with higher risk ratings usually require more management actions and controls. This minimises the likelihood of the risk occurring and reduces the consequences to acceptable levels.*	APPENDIX D:
Environmental management measures	
The environmental management plan should clearly state how the potential impacts of the proposal will be managed and this information usually forms the bulk of the content of the plan. For each potential impact, the plan should address: • *environmental management activities, controls and performance targets* • *environmental management maps and diagrams* • *monitoring programs with trigger values for corrective actions* • *corrective actions and non-compliance reporting* • *environmental schedules* *These topics are described in more detail below. It is helpful if management plans present the information on these topics for one potential impact at a time. This ensures that all the management measures for each potential impact are in the same section of the document and easy to locate.*	Section 5
Environmental management activities, controls and performance targets *The environmental management plan should describe all the environmental management activities and control measures that will be implemented to avoid or minimise environmental impacts. The description of each measure should also specify the timeframes for implementation and the performance targets or outcomes to be achieved. The timing of measures is often best presented in a timetable. Performance targets and outcomes should be quantitative and auditable.*	Section 5
Environmental management maps and diagrams *Environmental management maps and diagrams are useful visual tools that aid in environmental management activities. Maps can provide useful spatial information about areas that require environmental management. Diagrams can illustrate the design of environmental control measures and the flow of environmental management procedures. For example, a map could be used to show:* • *environmentally sensitive areas on or near a project site*	Figures throughout the OMP.

Guideline	Relevant OMP Section
• *vegetation that requires protection* • *buffer zones or 'no-go zones'* • *monitoring locations.*	
Environmental monitoring *The environmental management plan should specify how the effectiveness of environmental management measures will be monitored. It should include the methodology, frequency and duration of monitoring activities. It should also include trigger values or conditions under which corrective actions are taken. The plan should also specify if, and when, follow up action is required and how monitoring records will be maintained.*	Section 5.14 - 5.16
Corrective actions *The environmental management plan should include procedures for addressing:* • *monitoring results which exceed the trigger values for corrective action* • *potential corrective actions* • *reporting non-compliance with approval conditions to the relevant authority* • *environmental incidents and emergencies.*	Section 5.17 Section 6
The plan should also identify who is responsible for implementing the above procedures. Auditable systems should be developed for recording the implementation of these procedures and their outcomes.	Section 1.5
Audit and review	
Environmental auditing *The environmental management plan should include the schedule or triggers for auditing the implementation and effectiveness of the plan. It should address both internal and external audit requirements including who is responsible for undertaking the audits and reporting the results.*	Section 6.4
Environmental management plan review *The environmental management plan should specify the schedule or triggers for reviews of the plan. A review should assess whether the plan is achieving its objectives and the requirements of any relevant approval conditions. A review should take into account environmental monitoring records, corrective actions and the results of any audits. The plan should also identify who will be responsible for undertaking the review. During the review process, any reasons for varying the environmental management plan should be documented.*	Section 6.3
Review of an environmental management plan would typically be undertaken: • *following significant environmental incidents* • *when there is a need to improve performance in an area of environmental impact* • *periodically for actions undertaken over long timeframes such as one, two or five years.*	Section 6.3
However, if the person taking the action wishes to carry out any activity other than in accordance with the approved management plan specified in the approval conditions, the person taking the action is usually required to submit to us for the Minister's written approval a revised management plan. In these cases, the varied activity should not commence until the Minister has approved the varied management plan in writing. As a guiding principle, the Minister will not approve a varied management plan unless the revised management plan would result in an equivalent or improved environmental outcome over time.	Section 6.3
Glossary	
This should include any acronyms, all terms which are open to different interpretations or terms which are not in common use. Terms which are defined in the approval conditions should retain the same meaning as that used in the conditions.	p. viii
EVALUATING RISK	
The following section sets out a qualitative risk assessment methodology that can be applied to the environmental risks associated with a wide range of projects. It is provided as an example of one approach to risk assessment and the Department does not require that this particular approach be used when preparing an environmental management plan. Further guidance on evaluating and managing risk can be found in AS ISO 31000:2018 Risk management – Guidelines (Standards Australia 2018).	Section 5.17 and APPENDIX D:
Likelihood and consequence	

<table>
<tr><th>Guideline</th><th>Relevant OMP Section</th></tr>
<tr><td>Each environmental risk should be given a rating in terms of likelihood and consequence using the criteria in the table 1 and table 2 below. These ratings are then combined using the risk rating table to generate a risk rating of low, medium, high or severe.</td><td>APPENDIX D:</td></tr>
<tr><td>Table 1 Likelihood
<table>
<tr><th>Qualitative measure of likelihood</th><th>How likely is it that this event/issue will occur after control strategies have been put in place</th></tr>
<tr><td>Highly likely</td><td>Is expected to occur in most circumstances</td></tr>
<tr><td>Likely</td><td>Will probably occur during the life of the project</td></tr>
<tr><td>Possible</td><td>Might occur during the life of the project</td></tr>
<tr><td>Unlikely</td><td>Could occur but considered unlikely or doubtful</td></tr>
<tr><td>Rare</td><td>May occur in exceptional circumstances</td></tr>
</table>
Table 2 Consequences
<table>
<tr><th>Qualitative measure of consequences</th><th>What will be the consequence/result if this issue does occur rating</th></tr>
<tr><td>Minor</td><td>Minor incident of environmental damage that can be reversed</td></tr>
<tr><td>Moderate</td><td>Isolated but substantial instances of environmental damage that could be reversed with intensive efforts</td></tr>
<tr><td>High</td><td>Substantial instances of environmental damage that could be reversed with intensive efforts</td></tr>
<tr><td>Major</td><td>Major loss of environmental amenity and real danger of continuing</td></tr>
<tr><td>Critical</td><td>Severe widespread loss of environmental amenity and irrecoverable environmental damage</td></tr>
</table></td><td></td></tr>
<tr><td>Risk rating</td><td></td></tr>
<tr><td>You should give each of your risks a likelihood rating and a consequence rating. Using the rating table below you can determine whether your risk is low, medium, high or severe.</td><td>APPENDIX D:</td></tr>
<tr><td>The risk rating generated using the above table can be used as a guide to the amount of time and resources that will be required to manage each risk. Risks with ‘low’ risk ratings will usually require significantly less management than ‘medium’, ‘high’ and ‘severe’ risks.</td><td></td></tr>
<tr><td>This is usually reflected in the environmental management plan where issues with higher risk ratings require more detailed information regarding:

the description of the risk
the measures and commitments to minimise and manage the risk
the performance objectives and monitoring programs
trigger values for additional action, review and reporting.
</td><td></td></tr>
<tr><td>Table 3 Risk Rating
<table>
<tr><th></th><th colspan="5">Consequence</th></tr>
<tr><th></th><th>Minor</th><th>Moderate</th><th>High</th><th>Major</th><th>Critical</th></tr>
<tr><td>Highly Likely</td><td>Medium</td><td>High</td><td>High</td><td>Severe</td><td>Severe</td></tr>
<tr><td>Likely</td><td>Low</td><td>Medium</td><td>High</td><td>High</td><td>Severe</td></tr>
<tr><td>Possible</td><td>Low</td><td>Medium</td><td>Medium</td><td>High</td><td>Severe</td></tr>
<tr><td>Unlikely</td><td>Low</td><td>Low</td><td>Medium</td><td>High</td><td>High</td></tr>
<tr><td>Rare</td><td>Low</td><td>Low</td><td>Low</td><td>Medium</td><td>High</td></tr>
</table></td><td></td></tr>
<tr><td>FORMAT OF SUBMISSIONS</td><td></td></tr>
<tr><td>General</td><td></td></tr>
</table>

Guideline	Relevant OMP Section
Each page of the environmental management plan should include the name of the project, the date of the environmental management plan and sequential page numbering. An environmental management plan can be submitted via standard post or electronically. Submissions should be titled 'Environmental Management Plan' with the project name and EPBC approval number.	Header and Footer of each page
General requirements for maps, plans and sections	
All maps and sections should conform to the following standards.	Figures throughout the OMP.
• *Scale – an appropriate standard metric scale should be chosen to best represent the information required (for example 1:25 000, 1:10 000 and 1:5000).*	
• *Datum – plans and cross sections should refer to Australian Height Datum.*	
• *Title Block – plans should have a title block in the lower right-hand corner of the sheet with the following information:* – *EPBC number and project name* – *title and number of the plan* – *author* – *scale* – *date* – *source and date of data*	
• *Legend – plans should have a clear and comprehensive legend to identify the symbols and colours used.*	
• *Maps, plans, figures, images and sections should also:* – *use metric measurements throughout* – *show a graphic bar scale* – *show any local grid lines and standards* – *have a north point or orientation of sections* – *include a key.*	
Maps may also be submitted in ESRI Shapefiles containing '.shp', '.shx' and '.dbf' files.	

3 EXISTING ENVIRONMENT RELEVANT TO THE OFFSET AREAS

This section describes the existing environment relevant to the BOA. This section summarises the geography, prevailing climatic conditions; geology, topography and hydrology; land use history; threatened species and ecological communities; and introduced flora and fauna. It also provides a summary of the BOS approved for TCM including the key biodiversity values for each relevant strategy such as vegetation community descriptions and mapping.

3.1 GEOGRAPHY

The BOA is adjacent to Mount Kaputar National Park and the Willeroi East BOA (**Figure 3.1**) The BOA occurs wholly within the Peel IBRA sub-region of the Nandewar IBRA region (**Figure 3.2**) within the Narrabri Shire Council local government area (LGA).

3.2 CLIMATIC INFORMATION

The most central public meteorological station to the BOA is the Gunnedah Airport Automatic Weather Stations (AWS) and Pool sites (BOM 2020). Summer maximum temperatures in Gunnedah reach an average of 34.7°C (daily) and a minimum of 18.6°C (nightly) during January. Winter minimums are experienced in July with an average maximum of 17.4°C and an average minimum of 1.9°C. The average rainfall is 544.9 mm per year with the maximum received in December (82.3 mm) and the minimum in April (21.5 mm). However, recent years have seen extremes conditions. 2019 being the peak of a drought and the driest year in 140 years of records for Gunnedah (Pool) with only 237mm of rain recorded followed by three years with above average rainfall experienced peaking in 2021 with 990mm of rain

There is also a WHC weather stations located within the Willeroi property proximate to the BOA (shown in **Figure 3.1**) to record more localised weather conditions for reporting purposes (Advitech, 2023). Records from the weather station show a maximum monthly average temperature was 33°C in January 2023. Minimum monthly average temperature was 9°C in June 2023. Annual temperature ranges were 4°C to 38°C in 2023. The total annual rainfall in 2023 was 424mm with the maximum in March (110 mm) and minimum in May (1 mm).

3.3 GEOLOGY, TOPOGRAPHY AND HYDROLOGY

The BOA is predominantly mapped in Mitchell Landscape of Tamworth – Keepit Slopes and Plains with minor occurrence in Split Yard Plateau and Kaputar Slopes (**Figure 3.3**). The geology of the Tamworth – Keepit Slopes and Plains Mitchell Landscape consists of a complex geology of folded and faulted sedimentary and metamorphic rocks with minor interbedded volcanics (Mitchell, 2002).

The BOA contains Non-Calcic Brown Soils, Solodic Soils, Lithosols, Grey Brown and Red Clays (GSG) and Chromosols, Sodosols, Rudosol and Tenosol, Vertosols (ASC).

The topography of the BOA is variable with the minimum and maximum elevations within the BOA ranging from; 568m to 1069m.

The BOA is within the Namoi River Catchment (Murray Darling Basin Authority [MDBA], 2024) and natural drainage generally flows to the northwest. There are a number of named watercourses within the BOA including Pinnacle Creek which in turn flows on the floodplain of the Namoi River (Stream Order 9) (DPIE Water, 2024) (**Figure 3.3**).

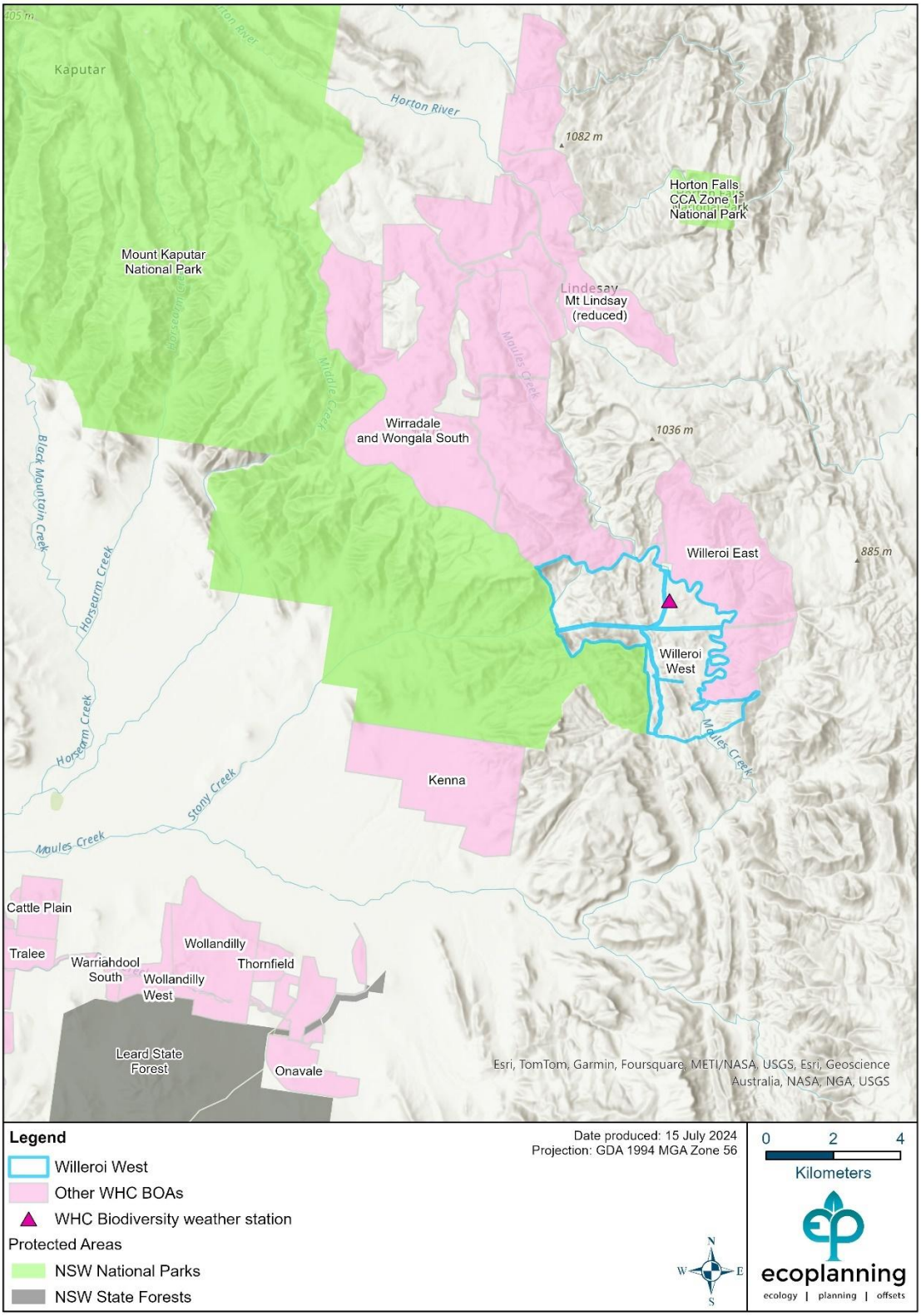

Figure 3.1: Proximity of the BOA to Mount Kaputar National Park and other BOAs and nearest weather station.

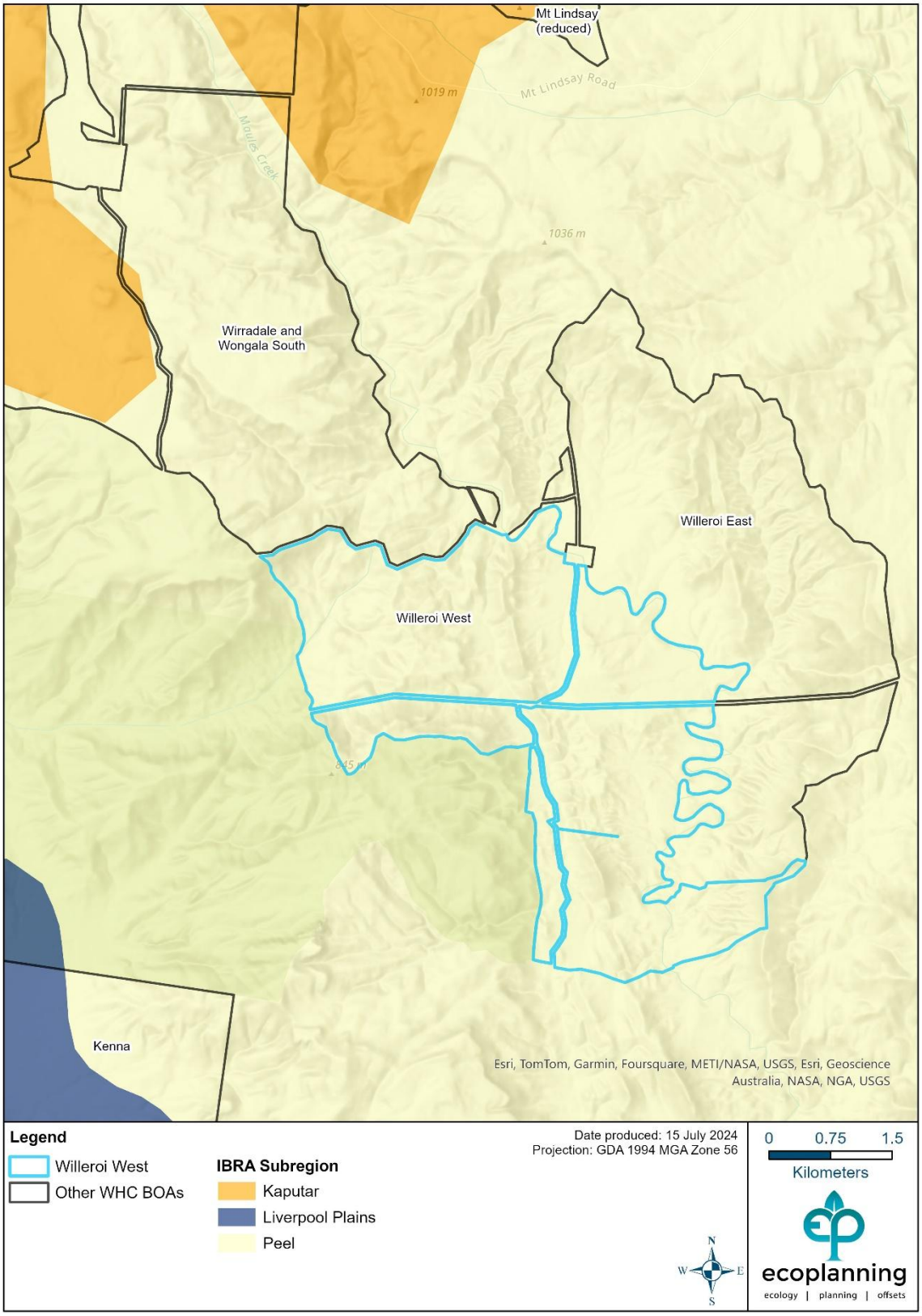

Figure 3.2: IBRA sub-regions of the BOA offset properties.

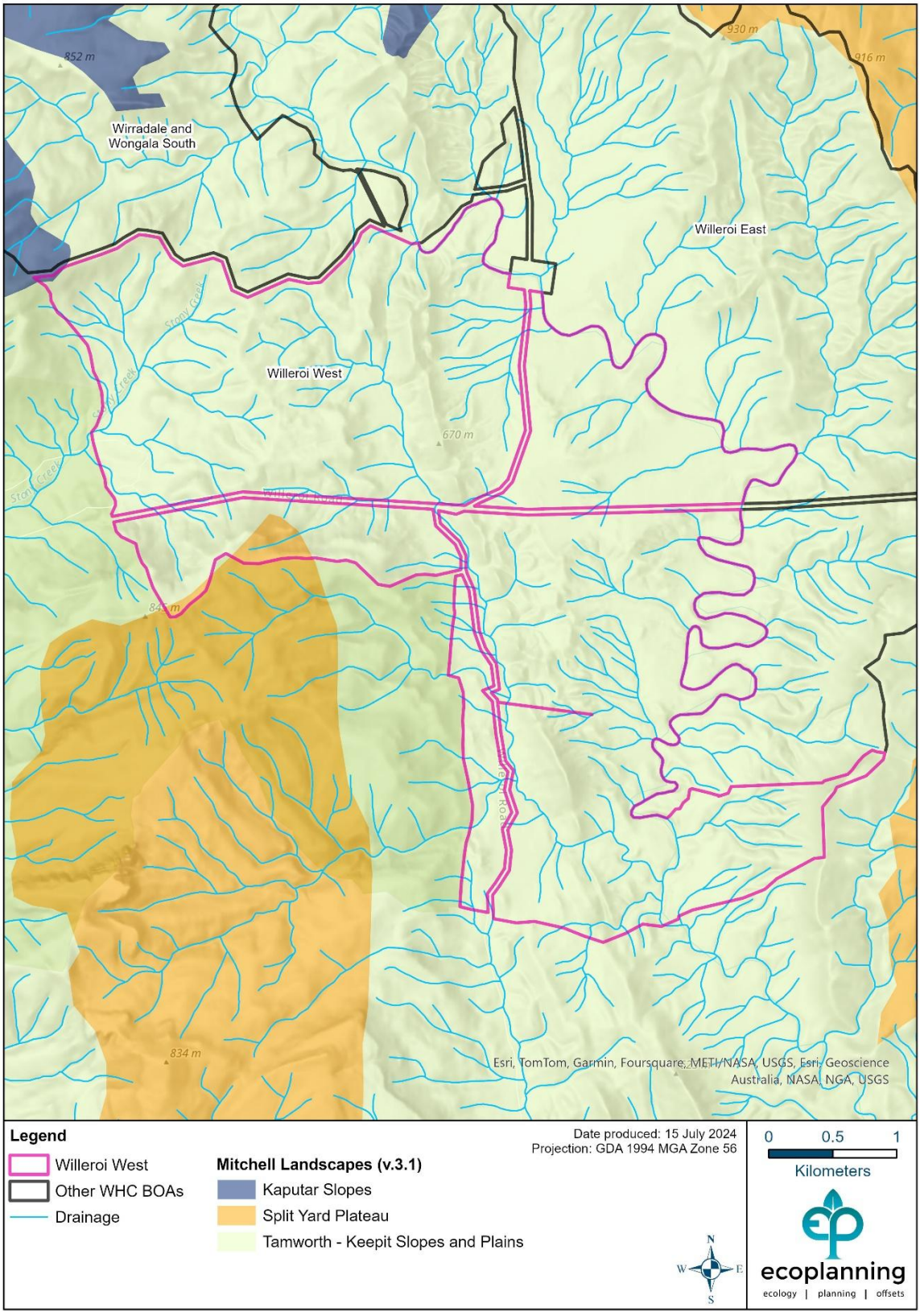

Figure 3.3: Mitchell landscapes and watercourses near the BOA.

3.4 PREVIOUS LAND USE HISTORY

The BOA previous agricultural management was predominantly grazing and logging with limited areas being cultivated as evidenced with localised high weed abundance. However, the extent of historical clearing on the BOA was limited to the central riparian and shallow slopes/flats adjacent to Maules Creek with majority of the property showing moderate to high flora and fauna diversity in the well vegetated (remnant to regenerating semi-cleared native vegetation) on steeper slopes and escarpments with high resilience given its proximity to the large remnant vegetation within the adjacent Mount Kaputar National Park. Biodiversity management commenced in 2015 when the BOA property was permanently de-stocked.

3.5 INTRODUCED FLORA AND FAUNA

At the commencement of Biodiversity Management, weed species were observed in localised areas in high abundance within the BOA due to the previous agricultural history. Since that time, through routine weed management; most priority weed species recorded during seasonal weed assessments (Ecoplanning, 2021, 2020a, 2020b) have declined with the remaining key weeds shown below in **Table 3.1**.

Table 3-1: Occurrence of weed species within the BOA

Species Name	Common Name	Priority Weed status for North West Region (LLS 2017)	Weed Threat Category*
Echium plantagineum	Paterson's Curse	General Biosecurity Duty	-
Hyparrhenia hirta	Coolatai Grass	General Biosecurity Duty	KTP
Lycium ferocissimum	African Boxthorn	Regional Recommended Measure. Land managers should mitigate the risk of new weeds being introduced to their land. Land managers should mitigate spread from their land. Land managers reduce impacts from the plant on priority assets.	WoNS
Opuntia stricta	Prickly Pear	Priority Weed - Prohibition on dealings	WoNS, KTP
Rosa rubiginosa	Sweet Briar	Regional Priority Weed – widely distributed in region and asset protection is the regional objective	KTP
Xanthium spinosum	Bathurst Burr	General Biosecurity Duty. All plants are regulated with a general biosecurity duty to prevent, eliminate or minimise any biosecurity risk they may pose. Any person who deals with any plant, who knows (or ought to know) of any biosecurity risk, has a duty to ensure the risk is prevented, eliminated or minimised, so far as is reasonably practicable.	HTE

*KTP = Key Threatening Process, WoNS = Weeds of National Significance, HTE = Hight Threat Exotic.

Similarly, at the commencement of Biodiversity Management, certain pest animals were widespread across the BOA given the previous agricultural history. However, since that time, through routine pest animal management; most species have declined in detection on average while others species appear only in discrete areas (**Table 3.2**) as collated from data collected during baseline assessments, annual fauna monitoring and from quarterly pest animal management reports (AMBS, 2023).

Table 3-2: Occurrence of Priority Pest animals in the BOA

Pest animals	Area of Occurrence (properties)
Feral Pig (*Sus scrofa*)	Has been detected in the BOA or is expected to occur
Feral Goat (*Capra hircus*)	Detected in the BOA

Pest animals	Area of Occurrence (properties)
European Red Fox (*Vulpes vulpes*)	Has been detected in the BOA or is expected to occur
European Rabbit (*Oryctolagus cuniculus*)	Has been detected in the BOA or is expected to occur
Feral Deer spp.(*Cervus* spp., *Axis* spp. or *Dama* spp.)	Detected in the BOA
Feral Cat (*Felis catus*)	Has been detected in the BOA or is expected to occur
Wild Dog (*Canis familiaris*)	Detected in the BOA

3.6 THREATENED ECOLOGICAL COMMUNITIES, FLORA AND FAUNA

Threatened Ecological Communities

One threatened ecological community (TEC) have been mapped within the BOA (**Table 3.3**).

White Box-Yellow Box-Blakely's Red Gum Grassy Woodland and Derived Native Grassland (referred to herein as Box-Gum Woodland [BGW]) Critically Endangered Ecological Community (CEEC), under the EPBC and BC Act has been mapped within the BOA.

Table 3-3: Threatened Ecological Community occurrence within the BOA

Ecological Community	Threatened Status		Area (ha)
	BC Act	EPBC Act	
Box-Gum Woodland	CEEC	CEEC	281.80

Threatened Fauna

All threatened fauna recorded or predicted to occur (based on potential habitat) within each BOA is shown below in **Table 3.4**. A site assessment and the habitat requirements of the potential species were then used to refine the list of threatened species likely to occur in the Willeroi West BOA (AMBS 2023).

Table 3-4: Recorded and Predicted Threatened Fauna within the BOA

Scientific Name	Common Name	Status		Habitat Requirements	Occurrence within the BOA
		BC Act	EPBC Act		
Birds					
Anthochaera phrygia	Regent Honeyeater	CE	CE	Mainly inhabit temperate woodlands and open forests of the inland slopes of south-east Australia.	P
Alectura lathami	Australian Brush-turkey (population in the Nandewar and Brigalow Belt South Bioregions)	-	V	The species is commonly associated with closed forest, including rainforest and vine thickets, as well as dense woodland habitats. More open dry woodland habitats are also used including open woodland dominated by Spotted Gum, *Corymbia maculata*, Brigalow, *Acacia harpophylla*, and Belah, Casuarina cristata. In NSW the inland vegetation type preferred by the Australian Brush-turkey is a dry rainforest community that is found within the Semi-evergreen Vine Thicket in the Brigalow Belt South and Nandewar Bioregions Endangered Ecological Community.	Yes
Artamus cyanopterus	Dusky Woodswallow	V	-	Inhabits dry, open eucalypt forests and woodlands, including mallee associations, with an open or sparse understorey of eucalypt saplings, acacias and other shrubs, and ground-cover of grasses or sedges and fallen woody debris. It has also been recorded in shrublands, heathlands and very occasionally in moist forest or rainforest. Also found in farmland, usually at the edges of forest or woodland	Yes
Chthonicola sagittata	Speckled Warbler	V	-	Eucalyptus dominated communities that have a grassy understorey, often on rocky ridges or in gullies. Typical habitat would include scattered native tussock grasses, a sparse shrub layer, some eucalypt regrowth and an open canopy.	Yes
Circus assimilis	Spotted Harrier	V	-	Occurs in grassy open woodland including *Acacia* and mallee remnants, inland riparian woodland, grassland and shrub steppe. It is found most commonly in native grassland, but also occurs in agricultural land, foraging over open habitats including edges of inland wetlands.	Yes
Climacteris picumnus victoriae	Brown Treecreeper (eastern subspecies)	V	-	Found in eucalypt woodlands (including Box-Gum Woodland) and dry open forest of the inland slopes and plains inland of the Great Dividing Range; mainly inhabits woodlands dominated by stringybarks or other rough-barked eucalypts, usually with an open grassy understorey, sometimes with one or more shrub species; also found in mallee and River Red Gum (Eucalyptus camaldulensis) Forest bordering wetlands with an open understorey of acacias, saltbush, lignum, cumbungi and grasses; fallen timber is an important habitat component for foraging.	Yes

Scientific Name	Common Name	Status		Habitat Requirements	Occurrence within the BOA
		BC Act	EPBC Act		
Daphoenositta chrysoptera	Varied Sittella	V	-	Inhabits eucalypt forests and woodlands, especially those containing rough-barked species and mature smooth-barked gums with dead branches, mallee and Acacia woodland.	Yes
Glossopsitta pusilla	Little Lorikeet	V	-	Forages primarily in the canopy of open Eucalypt forest and woodland, yet also finds food in Angophora, Melaleuca and other tree species. Riparian habitats are particularly used, due to higher soil fertility and hence greater productivity.	Yes
Hirundapus caudacutus	White-throated Needletail	-	V	Migratory	Yes
Lathamus discolor	Swift Parrot	E	CE	The Swift Parrot occurs in woodlands and forests of New South Wales from May to August, where it feeds on eucalypt nectar, pollen and associated insects.	P
Melanodryas cucullata	Hooded Robin (south-eastern form)	V	-	Prefers lightly wooded country, usually open eucalypt woodland, acacia scrub and mallee, often in or near clearings or open areas. Requires structurally diverse habitats featuring mature eucalypts, saplings, some small shrubs and a ground layer of moderately tall native grasses.	Yes
Neophema pulchella	Turquoise Parrot	V	-	Lives on the edges of eucalypt woodland adjoining clearings, timbered ridges and creeks in farmland. Nests in tree hollows, logs or posts.	Yes
Petroica boodang	Scarlet Robin	V	-	Lives in dry eucalypt forests and woodlands. The understorey is usually open and grassy with few scattered shrubs. The species lives in both mature and regrowth vegetation. It occasionally occurs in mallee or wet forest communities, or in wetlands and tea-tree swamps. Logs and fall timber are an important component of its habitat.	P
Pomatostomus temporalis	Grey-crowned Babbler (eastern sub-species)	V	-	Inhabits open Box-Gum Woodlands on the slopes, and Box-Cypress-pine and open Box Woodlands on alluvial plains. Woodlands on fertile soils in coastal regions.	Yes
Stagonopleura guttata	Diamond Firetail	V	-	Found in grassy eucalypt woodlands, including Box-Gum Woodlands and Snow Gum Eucalyptus pauciflora Woodlands. Also occurs in open forest, mallee, Natural Temperate Grassland, and in secondary grassland derived from other communities.	Yes
Tyto novaehollandiae	Masked Owl	V	-	Lives in dry eucalypt forests and woodlands from sea level to 1100 m. Roosts and breeds in moist eucalypt forested gullies, using large tree hollows or sometimes caves for nesting.	P
Mammals					
Chalinolobus dwyeri	Large-eared Pied Bat	V	V	Roosts in caves (near their entrances), crevices in cliffs, old mine workings and in the disused, bottle-shaped mud nests of the Fairy Martin (Petrochelidon ariel), frequenting low to mid-elevation dry open forest and woodland close to these features.	Yes

Scientific Name	Common Name	Status		Habitat Requirements	Occurrence within the BOA
		BC Act	EPBC Act		
Dasyurus maculatus	Spotted-tailed Quoll	V	E	Recorded across a range of habitat types, including rainforest, open forest, woodland, coastal heath and inland riparian forest, from the sub-alpine zone to the coastline. Hollow-bearing trees, fallen logs, other animal burrows, small caves and rock outcrops are used as den sites.	P
Miniopterus orianae oceanensis	Eastern Bentwing-bat	V	-	Caves used as primary roosting habitat	Yes
Nyctophilus corbeni	South-eastern Long-eared Bat	V	V	Variety of vegetation types, including mallee, bulloke Allocasuarina leuhmanni and box eucalypt dominated communities, but it is distinctly more common in box/ironbark/cypress-pine vegetation that occurs in a north-south belt along the western slopes and plains of NSW and southern Queensland.	Yes
Petaurus norfolcensis	Squirrel Glider	V	-	Inhabits mature or old growth Box, Box-Ironbark woodlands and River Red Gum forest west of the Great Dividing Range and Blackbutt-Bloodwood forest with heath understorey in coastal areas.	Yes
Phascolarctos cinereus	Koala	E	E	Inhabit eucalypt woodlands and forests.	Yes
Saccolaimus flaviventris	Yellow-bellied Sheath-tailed Bat	V	-	Tree hollows and buildings; in treeless areas they are known to utilise mammal burrows.	Yes
Reptiles					
Uvidicolus sphyrurus	Border Thick-tailed Gecko	V	-	Species often occurs on steep rocky or scree slopes, especially granite.	Yes

P=Potential, Yes=recorded or observed

4 BIODIVERSITY OFFSET STRATEGY (BOS) AND SECUREMENT

4.1 TCM BOS

A summary of the minimum requirements within the various NSW and Commonwealth approvals for land-based offsetting needing to be met in the TCM BOS are:

- 1660 ha of Native Vegetation including restoration of 193 ha of Box Gum Woodland CEEC (MP 11_0047 Schedule 3 Condition 40);
- Retirement of Ecosystem Credits [PCT101 (3), PCT847 (2)] (MP 11_0047 Schedule 3 Condition 40A);
- Retirement of Species Credits [Slender Darling Pea (4)] (MP 11_0047 Schedule 3 Condition 40A);
- 1055 ha of Regent Honeyeater habitat (EPBC Approval 2011/5923 Condition 6a);
- 397 ha of Swift Parrot habitat (EPBC Approval 2011/5923 Condition 6b);
- 1,355 ha of South-eastern Long-eared Bat (now known as Corben's Long-eared Bat) habitat (EPBC Approval 2011/5923 Condition 6c); and
- 232 ha of White Box-Yellow Box-Blakely's Red Gum Grassy Woodland and Derived Native Grassland (EPBC Approval 2011/5923 Condition 6d).

TCM retired the credit obligation (MP 11_0047 Schedule 3 Condition 40A) by paying into the Biodiversity Conservation Fund (BCF) on 24th December 2021 and the BCT providing a Statement Confirming Payment into BCF for an Offset Obligation on 10th January 2022.

To meet the remaining approval requirements; WHC established the Willeroi West BOA (the western portion of the Willeroi offset property; **Figure 4.1**). The TCM RBOS (AMBS 2024a; **APPENDIX H:**) outlines how Willeroi West provides equivalent or improved biodiversity outcomes to the original BOS requirements from NSW Approval 11_0047 and equivalent or greater areas of habitat for the Regent Honeyeater Swift Parrot, Corben's Long-eared Bat and for the White Box Yellow Box Blakely's Red Gum Grassy Woodland and Derived Native Grassland ecological community to meet Commonwealth requirements in EPBC Act Approval 2011/5923 (Condition 6).

A comparison between the BOS and the RBOS shows variation between the vegetation types mapped. While there is variation; overall the RBOS meets the biodiversity value requirements as per the TCM Approvals (NSW 11_0047 & EPBC Act 2011/5923) relating to Threatened Ecological Communities (TECs) and threatened fauna habitat, and the extent of offset area and area required for "enhanced, and additional native vegetation to be established with the restoration" (i.e. revegetation and habitat augmentation). The RBOS has resulted in an increase in the area of TECs within the offset area (**Table 4-1**) of 49.8 ha. There will be no change to the status of the threatened plants recorded on the Willeroi West property as a result of the TCM RBOS. The habitat areas identified contain 1,385.67 ha of potential Regent Honeyeater (*Anthochaera phrygia*) habitat (greater than the minimum 1,055 ha) and 1,335.32 ha of potential Swift Parrot (*Lathamus discolor*) habitat (greater than the minimum 397 ha), and 1,356.90 ha of potential Corben's Long-eared Bat habitat (greater than the minimum 1,355 ha) as required under Condition 6 of the EPBC Act Approval 2011/5923. The RBOS does not alter or vary existing BOS commitments as described in NSW Approval 11_0047 and Commonwealth Approval 2011/5923. All commitments are maintained or exceeded as detailed in the following table (**Table 4-1**).

Table 4-1: Summary of requirements of NSW PA 11_0047 and/or EPBC 2011/5923 and how they have been met.

Biodiversity Offset Strategy Criteria (PA11_0047 and/or EPBC 2011/5923)	Required Quantum for Biodiversity Offset Strategy (ha)	Quantum in Revised Biodiversity Offset Strategy (ha)	Difference (Revised BOS - Required BOS)
Minimum Area	1,660	1,660.03*	+0.03
Area of Box Gum Woodland CEEC (2011/5923)	232	281.80	+49.8
Box Gum Woodland CEEC (11_0047)	193	281.80	+88.8
Potential Regent Honeyeater Habitat (2011/5923)	1055	1385.67	+330.67
Potential Swift Parrot (2011/5923) Habitat	397	1,335.32	+938.32
Potential Habitat Corben's Long-eared Bat (2011/5923)	1355	1356.90	+1.9

* includes 14 dams and associated infrastructure (3.88 ha).

4.2 OFFSET SECUREMENT

To meet compliance with securement of the TCM BOS; WHC made application on 7 May 2018 for a Conservation Agreement over the BOA. The NSW BCT advised that on the 24 June 2021; the Willeroi (CA0060) Conservation Agreement was registered on title (Lots 31, 44, 46 and 47 in Deposited Plan 754941) and therefore secured under Part 5 Division 3 of the BC Act. DPE and CDCCEEW were notified on 21 July 2021 that compliance had been achieved with EPBC Approval 2011/5923 Condition 10 and PA 11_0047 Schedule 3 Condition 46.

4.3 VEGETATION COMMUNITIES, FAUNA HABITAT AND CONDITION

The original TCM BOS vegetation mapping (undertaken by FloraSearch [2011] using an older classification system) was revised by AMBS in 2022 utilising quantitative biometrics to define vegetation assemblages for the application of the required PCT. The revised vegetation communities are outlined in **Table 4-2** and displayed in **Figure 4.1**. The extent of Box-Gum Woodland CEEC in the BOA is listed in **Table 4-3.** and shown on **Figure 4.2**.

Table 4-2 : Vegetation Communities in the Offset Area.

PCT	Community Name	Keith Formation	Keith Class	Area (ha)
84	River Oak - Rough-barked Apple - red gum - box riparian tall woodland (wetland) of the Brigalow Belt South and Nandewar Bioregions	Forested Wetlands	Eastern Riverine Forests	35.14
112	Black Tea-tree - River Oak - Wilga riparian low forest/shrubland wetland of rich soil depressions in the Brigalow Belt South Bioregion	Forested Wetlands	Inland Riverine Forests	21.58
563	White Box - Silvertop Stringybark +/- White Cypress Pine grass shrub open forest of the southern Nandewar Bioregion and New England Tablelands Bioregion	Dry Sclerophyll Forests (Shrub/grass sub-formation)	North-west Slopes Dry Sclerophyll Woodlands	50.36
588	White Box - White Cypress Pine shrubby hills open forest mainly in the Nandewar Bioregion	Dry Sclerophyll Forests (Shrub/grass sub-formation	North-west Slopes Dry Sclerophyll Woodlands	51.23
589	White Box - White Cypress Pine - Silver-leaved Ironbark grassy woodland on mainly clay loam soils on hills mainly in the Nandewar Bioregion	Dry Sclerophyll Forests (Shrub/grass sub-formation	North-west Slopes Dry Sclerophyll Woodlands	55.13

PCT	Community Name	Keith Formation	Keith Class	Area (ha)
592	Narrow-leaved Ironbark - cypress pine - White Box shrubby open forest in the Brigalow Belt South Bioregion and Nandewar Bioregion	Dry Sclerophyll Forests (Shrubby sub-formation)	Western Slopes Dry Sclerophyll Forests	486.68
594	Silver-leaved Ironbark - White Cypress Pine shrubby open forest of Brigalow Belt South Bioregion and Nandewar Bioregion	Dry Sclerophyll Forests (Shrub/grass sub-formation	North-west Slopes Dry Sclerophyll Woodlands	177.14
1308	White Box - White Cypress Pine shrubby open forest of the Nandewar Bioregion and Brigalow Belt South Bioregion	Dry Sclerophyll Forests (Shrub/grass sub-formation	North-west Slopes Dry Sclerophyll Woodlands	477.22
1383	White Box grassy woodland of the Nandewar Bioregion and Brigalow Belt South Bioregion	Grassy Woodlands	Western Slopes Grassy Woodlands	301.68
-	Non-native vegetation			3.88
	TOTAL			**1660.03**

Table 4-3: Extent of Box-Gum Woodland within the BOA.

PCT	Community Name	Condition	Area (ha)
1383	White Box grassy woodland of the Nandewar Bioregion and Brigalow Belt South Bioregion	White Box grassy woodland	54.32
		Derived Native Grassland	227.48
		Total Box-Gum Woodland CEEC	**281.80**

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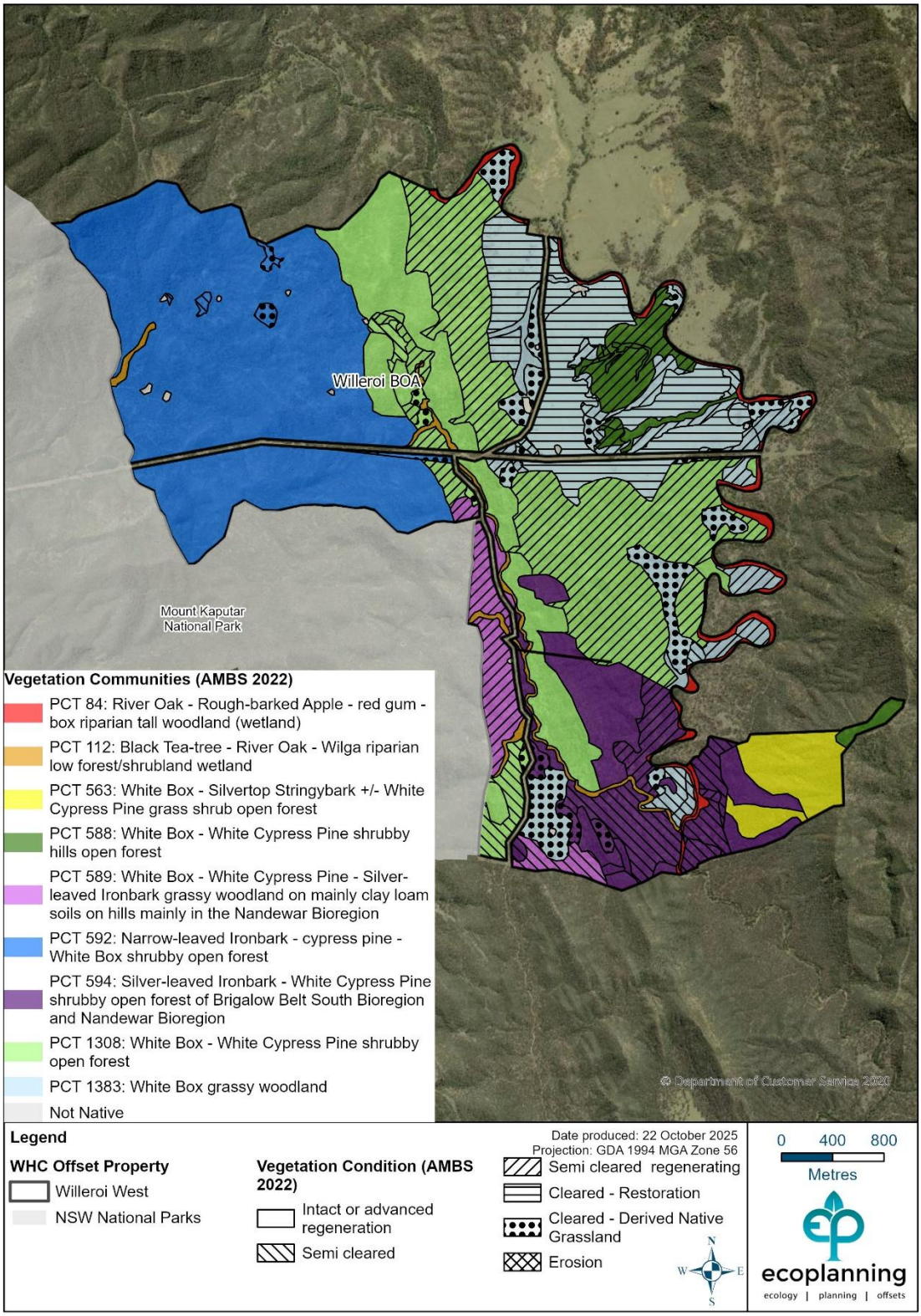

Figure 4.1: Vegetation Communities – Willeroi West BOA

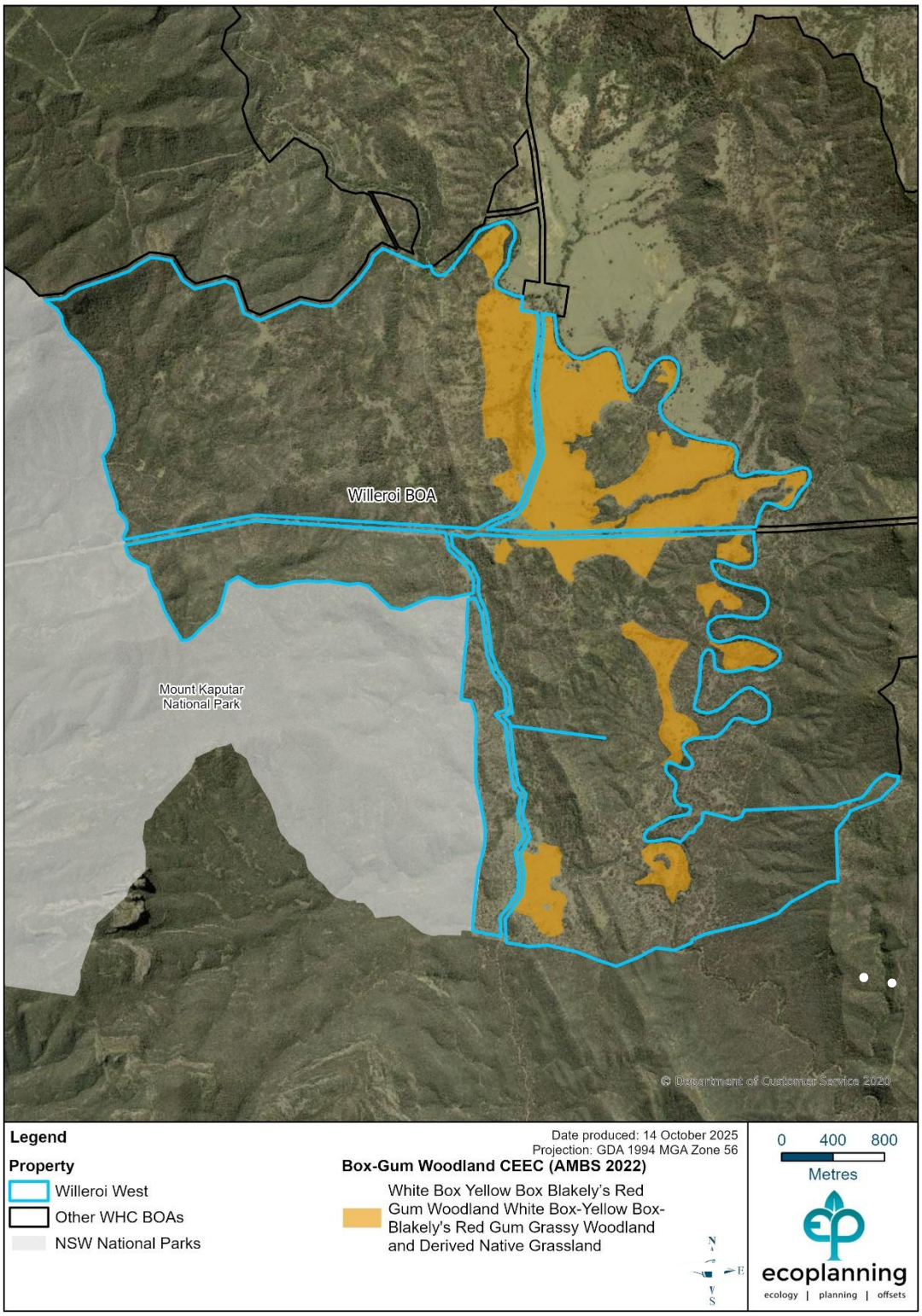

Figure 4.2: Box-Gum Woodland CEEC within the BOA

Table 4.3 quantifies the relevant habitat provided for the three specific Matters of National Environmental Significance (MNES) species for each vegetation community at the BOA, shown also in **Figure 4.3**, **Figure 4.4** and **Figure 4.5**.

Table 4-4: Vegetation Type providing habitat for Key MNES Species required for TCM BOS

PCT	Community Name	Swift Parrot	Regent Honeyeater	Greater Long-eared Bat
84	River Oak - Rough-barked Apple - red gum - box riparian tall woodland (wetland) of the Brigalow Belt South and Nandewar Bioregions	35.14	35.14	35.14
112	Black Tea-tree - River Oak - Wilga riparian low forest/shrubland wetland of rich soil depressions in the Brigalow Belt South Bioregion	0.00	0.00	21.58
563	White Box - Silvertop Stringybark +/- White Cypress Pine grass shrub open forest of the southern Nandewar Bioregion and New England Tablelands Bioregion	0.00	50.36	0.00
588	White Box - White Cypress Pine shrubby hills open forest mainly in the Nandewar Bioregion	51.23	51.23	51.23
589	White Box - White Cypress Pine - Silver-leaved Ironbark grassy woodland on mainly clay loam soils on hills mainly in the Nandewar Bioregion	55.13	55.13	55.13
592	Narrow-leaved Ironbark - cypress pine - White Box shrubby open forest in the Brigalow Belt South Bioregion and Nandewar Bioregion	479.75	479.75	479.75
594	Silver-leaved Ironbark - White Cypress Pine shrubby open forest of Brigalow Belt South Bioregion and Nandewar Bioregion	169.10	169.10	169.10
1308	White Box - White Cypress Pine shrubby open forest of the Nandewar Bioregion and Brigalow Belt South Bioregion	472.60	472.60	472.60
1383	White Box grassy woodland of the Nandewar Bioregion and Brigalow Belt South Bioregion	72.37	72.37	72.37
-	Non-native vegetation	0.00	0.00	0.00
	TOTAL	**1335.32**	**1385.68**	**1356.90**

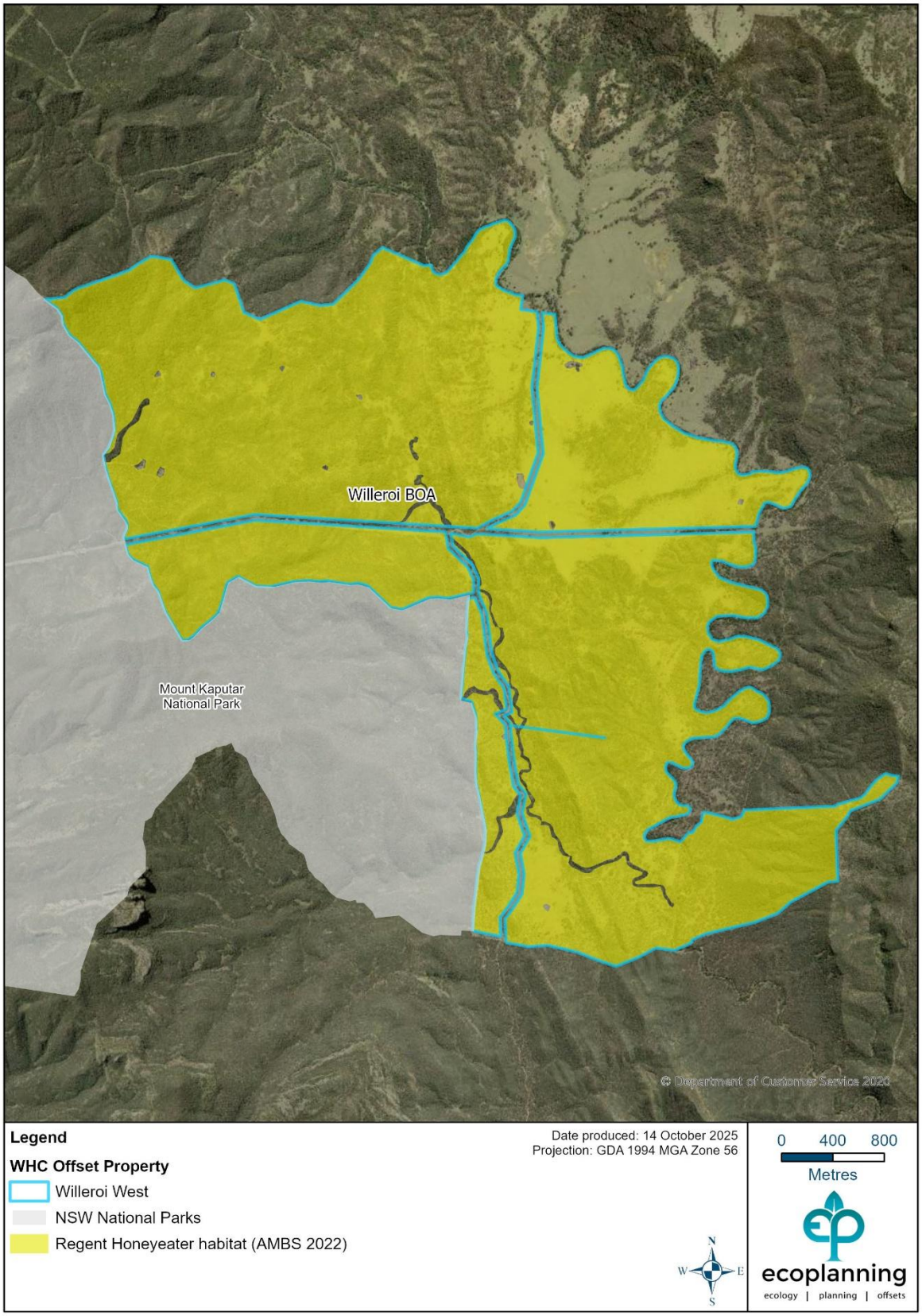

Figure 4.3: Regent Honeyeater habitat within the BOA

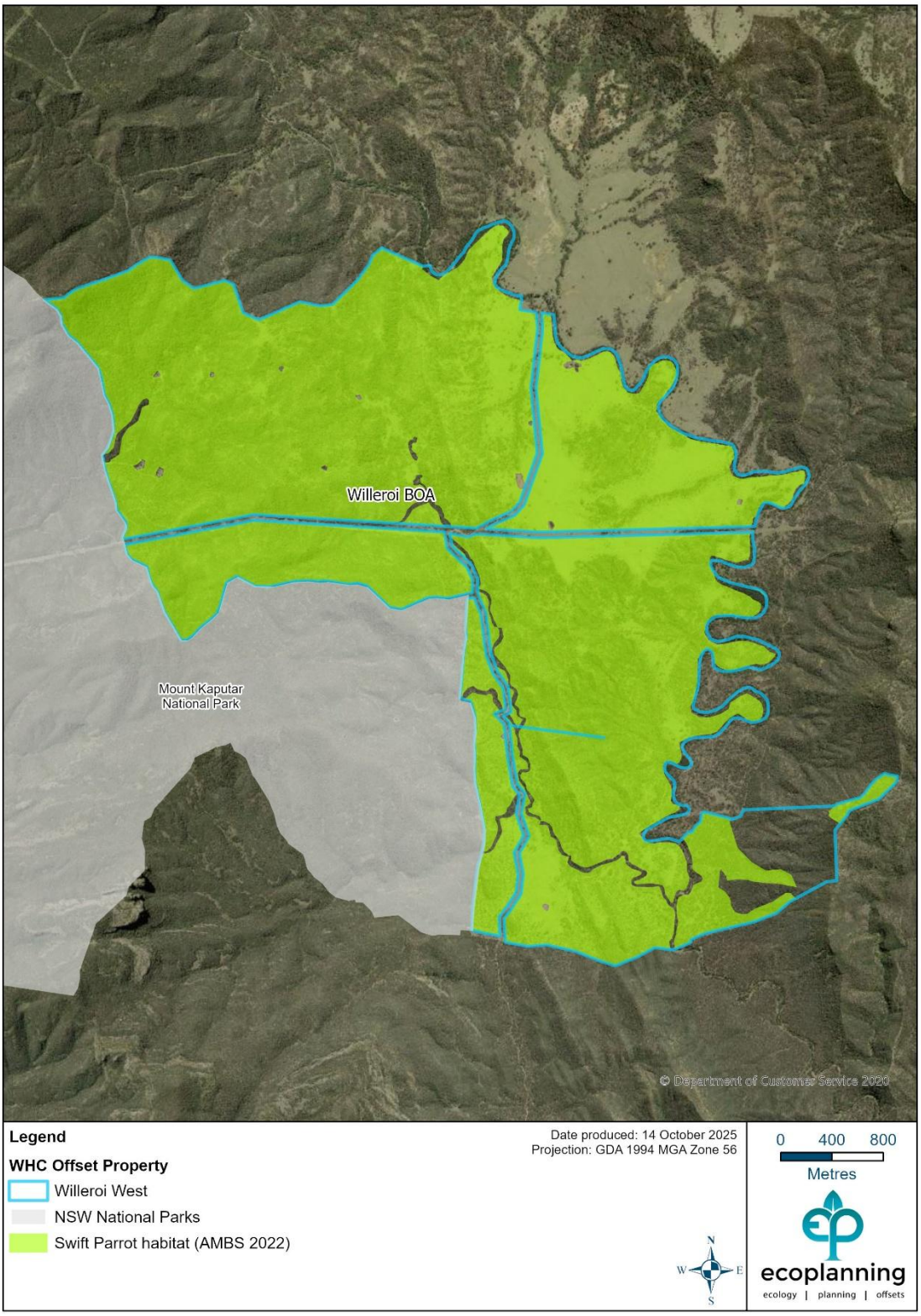

Figure 4.4: Swift Parrot habitat within the BOA

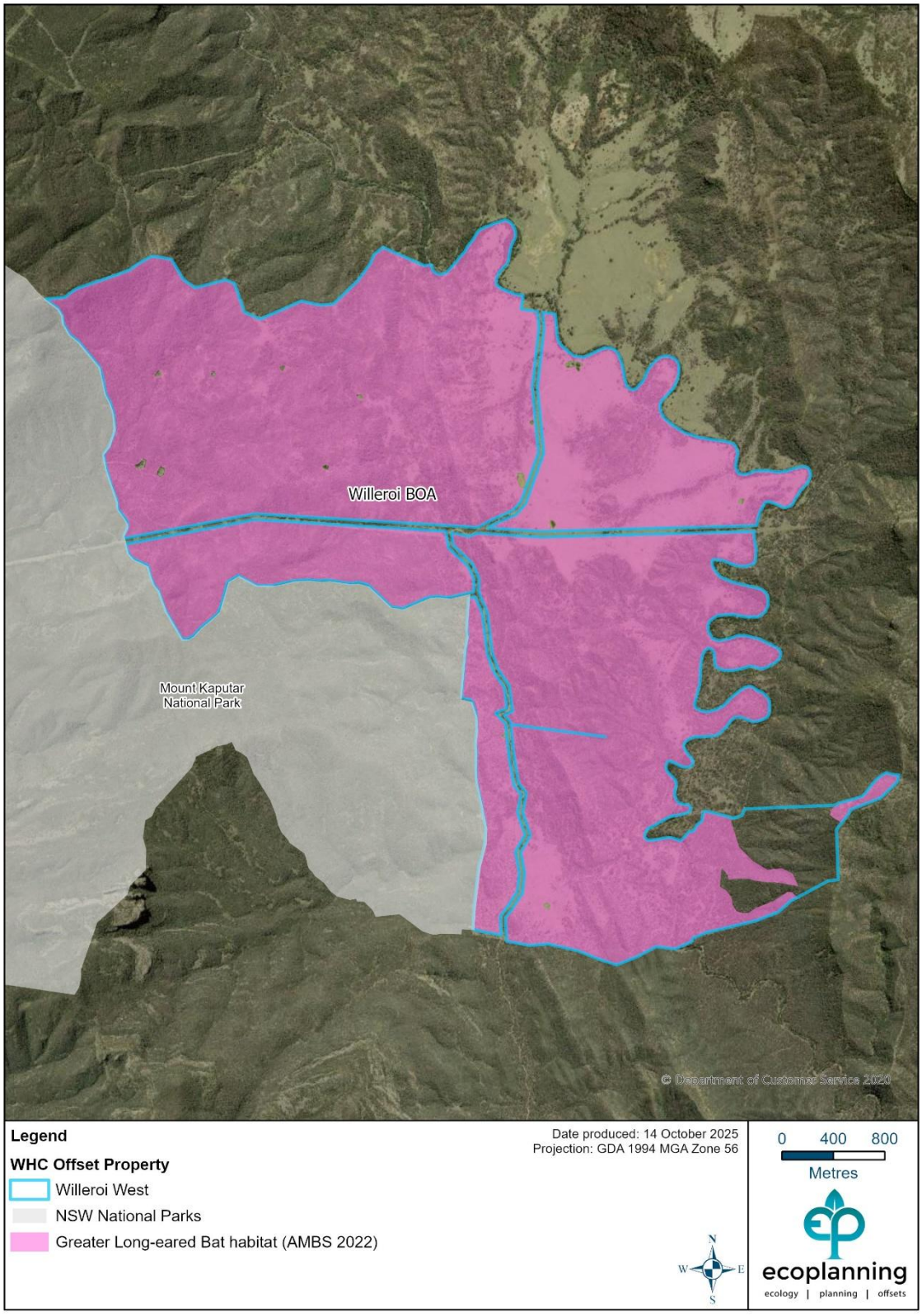

Figure 4.5: Greater Long-eared Bat habitat within the BOA

5 MANAGEMENT OF THE BIODIVERSITY OFFSET AREAS

This section describes the management measures to be implemented in the BOA. The management regime in the offset areas will be adaptive over time to achieve the ecological management objectives.

5.1 ECOLOGICAL MANAGEMENT OBJECTIVES

The ecological management objectives specific to each BOA are shown below in **Table 5.1**.

Table 5-1: Ecological Management Objectives specific to the BOA

Mine BOS	Ecological Management Objectives
TCM BOS	• protect and enhance existing Box-Gum Woodland CEEC (woodland form) • restore self-sustaining woodland within existing areas of Box-Gum Woodland CEEC (derived native grassland) • protect and enhance existing woodland and forest habitat for Regent Honeyeater and *S*wift Parrot • protect and enhance existing woodland and forest habitat for Corben's Long-eared Bat • restore self-sustaining woodland and/or forest within derived native grasslands and 'non-native/Cleared' areas to provide habitat for the Speckled Warbler, Brown Treecreeper, Grey-crowned Babbler, Hooded Robin, Varied Sittella, Turquoise Parrot, Masked Owl, Yellow-bellied Sheath Tail Bat and Squirrel Glider • Enhance existing vegetation and establish additional vegetation

5.2 IMPLEMENTATION SCHEDULE

The following **Table 5.2** summarises the management actions described and the frequency/timing of when those actions are to occur.

Table 5-2: OMP Implementation Schedule

Section	Management Action	Frequency and/or Timing
5.3.1	Tracks and Fences	Biannual/as required
5.3.2	Other Offset Infrastructure	Biannual
5.3.3	Signage and Inspections	Biannual/as required
5.3.4	Long Term Security	Complete
5.3.5	Conservation Bond	Annual
5.3.6	Biodiversity Offset Area Divestment	When required
5.4	Seed Management	Seasonal, based on life cycle stage and development of native plants
5.5	Revegetation	Annual (dependent on seasonal conditions)
5.6	Ecological Thinning	As required by assessment
5.7	Habitat Augmentation	As required by assessment
5.8	Heritage Management	Annual
5.9	Weed Management	Seasonal (dependent on seasonal conditions)
5.10	Pest Animal Management	Seasonal (dependent on seasonal conditions)
5.11	Erosion Management	Annual
5.12	Agriculture Management	As required
5.13	Bushfire Management	Annual/as required (dependent on seasonal conditions)
5.14	Flora Monitoring	Annual
5.15	Fauna Monitoring	Annual and biennial
5.16	Performance and Completion Criteria	Annual
5.17	Potential Risks and Contingency Measures	As required

5.3 BIODIVERSITY OFFSET AREA ESTABLISHMENT

This section outlines WHC's approach to the demarcation of the BOA boundaries for controlling access (including the use of signage) and provision for the long-term security of the offset areas (including provision of conservation bonds) in accordance with the Project and EPBC Act Approvals (**Table 2-2**; **APPENDIX A:**).

5.3.1 Tracks and Fences

Access tracks and fence lines are to be located on or adjacent to the actual BOA boundary wherever practicable. The use of existing fences will be maximised in the first instance as the BOA boundary, to reduce additional disturbance. This will secure the BOA by minimising the likelihood of inadvertent grazing, unauthorised disturbance, or unauthorised access into the BOA. Wherever practical, new fencing will prioritise the use of plain wire fencing (minimising the use of barbed wire). Redundant internal fencing within the BOA will be progressively removed overtime.

New access tracks and fences will be located, as required (e.g., for access tracks, fence maintenance or replacement), in consideration of biodiversity (such as threatened species) and heritage constraints. Due diligence inspections will be undertaken prior to any disturbance, and new tracks and fences will

be constructed in consideration of Conservation Agreements which for access tracks and permanent fences limits total clearing to 6 m total width. Neighbours who don't pose a risk of unauthorised access or stock incursion (such as National Parks or similar estate and/or other BOAs) who border the BOA boundaries will be consulted over the need for boundary fencing and if agreed, the boundary fencing will be removed to minimise future impact to native species (Umwelt, 2017).

Ongoing monitoring and site inspections undertaken by WHC will note any damage or disrepair of fences and undertake maintenance/repair as required. If in instances where barbed-wire fencing is being used and is found to be restrictive or damaging to fauna, ecologically-friendly alternatives will be investigated.

5.3.2 Other Offset Infrastructure

Existing infrastructure (such as electricity transmission lines, windmills/water bores and pipes, homesteads and sheds) wholly or partly within the BOA will be retained and managed as required by the relevant owners and/or managers/licensees. Any existing infrastructure no longer required will be progressively removed overtime.

Existing farm dams within the BOA will be assessed for habitat and if not required for management or habitat; will be filled in. The filled in farm dams will be revegetated to minimise soil erosion.

New infrastructure will be located, as required, in consideration of biodiversity (such as threatened species) and heritage constraints, and due diligence inspections will be undertaken prior to any disturbance. Clearing and earthworks required for the construction of any new infrastructure or maintenance of existing infrastructure will take into consideration the limits specified in Conservation Agreements, as outlined below:

- For pipelines, a 3 m total width of clearing is permissible;
- For tanks (other than a ground tank), pumps and water points, a 3 m width of clearing from the outer edge of the structure is permissible;
- For bores and windmills, a 10 m width of clearing from the outer edge of the structure is permissible;
- For soil conservation earthworks, telephone lines or cables, power lines or cables or areas for movement of large machinery and dams up to 15 m width of clearing from the outer edge is permissible;
- For buildings other than habitable buildings (including shearing or machinery shed), a 20 m width of clearing from the outer edge is permissible; and
- For areas of electricity transmission refer to Clause 24 Electricity transmission infrastructure, Schedule 5A Allowable activities clearing of native vegetation *Local Land Services Act 2013 (NSW)*.

5.3.3 Signage and Inspections

Signage will be installed on gates and/or other access points into the BOA that identifies the property/domain name as a 'Biodiversity Offset Area', and that authorised access only is allowed.

Routine (6 monthly) inspections will assess fencing, gates, access tracks and signage for maintenance issues and disturbance factors (including fire, unauthorised access and evidence of waste), limited by health and safety considerations, resources, accessibility, weather and/or ground conditions. Maintenance of all access tracks, fences and gates will be undertaken as required.

5.3.4 Long Term Security

The Willeroi offset property have been secured in perpetuity by an appropriate legal mechanism as set out in **Table 5.3**. Now that securement is complete, WHC will re-engage with NPWS who have previously shown interest in Offset properties being transferred to National Park Estate including the BOA to Mount Kaputar National Park.

Table 5-3: Long-term security provisions for the BOA

Long-term Security Provision	Offset Property	Legally Binding Conservation Covenant	Registered
Entering into a conservation agreement or agreements pursuant to section 69B of the National Parks and Wildlife Act 1974, recording the obligations assumed by the Proponent under the conditions of this approval in relation to these offset areas, and registering the agreement(s) pursuant to section 69F of the National Parks and Wildlife Act 1974; or A tenure of higher conservation status such as a National Park, or Nature Reserve, under the National Parks and Wildlife Act 1974.	Willeroi (East & West)	CA0060	24/06/2021

5.3.5 Biodiversity Offset Area Conservation Bond

In accordance with Condition of Schedule 3 to CA0060 have approved Conservation and Biodiversity Bonds lodged with NSW DPHI. These bonds have been updated as per the details in ensuring the BOS for the BOA can be implemented in accordance with the performance and completion criteria if management was unable to be continued for the offset.

Table 5-4: Recent updates of Conservation Bonds for the BOA

BOA	Current Conservation and Biodiversity Bond	Costs verified by	DPE Approval	Cost estimate at time of Approval
Willeroi (TCM/VCM)	30 October 2023	Lindsay Doyle & Associates	20 November 2023	$10,649,239.34

The sum of each bond has been determined by calculating the cost of implementing the BOS (not including land acquisition costs) in perpetuity. The sum of each bond has included all offset area management measures, staff costs, fencing, fire management, weed management, feral animal control, seed collection, replanting/revegetation, monitoring, auditing and reporting. A suitably qualified quantity surveyor has been employed to verify the calculated costs.

As required, WHC will review and accordingly update the Conservation Bond (nominally annually) based on the progressive completion of biodiversity management works. Once the updated Conservation and Biodiversity Bond is lodged with NSW DPHI; in accordance with Approval Conditions, WHC has one month to submit details to CDCCEEW.

5.3.6 Biodiversity Offset Area Divestment

The long term securement for the TCM BOA will be for the ownership to be divested at an appropriate time in the future to another organisation best placed for in perpetuity management of lands for biodiversity conservation and restoration. One such divestment option that has been considered in the Approvals is the transfer to national park estate managed by NSW National Parks and Wildlife Service

(NPWS). In a letter dated 16 August 2017, NPWS advised WHC of its interest in the transfer and reservation of BOA properties including Willeroi, subject to payment of an in perpetuity management fee and based on a certain standard of biodiversity and property condition (i.e. fencing and fire trials constructed, advanced revegetation, infrastructure/waste removed and hazardous/contaminated material remediated). At the time, due to the elongated transfer period and imminent EPBC Act Approval 2011/5923 securement deadline, transfer negotiations were to be deferred until after securement had been achieved via conservation agreements. Now that WHC has secured all BOAs with Conservation Agreements registered on title; therefore WHC will reengage with NPWS regarding transfer to national park estate of those BOA including Willeroi West in respect of which NPWS has previously shown interest in, and to discuss if NPWS would now have interest in other TCM BOA. WHC contacted NPWS (Executive Director, Park Operations Inland) in July 2024 following up on NPWS previous consideration of proposed offset transfers to National Park Estate; with NPWS responding in August 2024 confirming a new contact point within NPWS and following handover/background, will be back in contact with WHC in due course.

WHC will seek endorsement from NSW DPHI, NSW DCCEEW and CDCCEEW when a transfer agreement is executed with NPWS, and this OMP will be revised accordingly.

5.4 SEED MANAGEMENT

WHC coordinates routine seed assessment programs designed to identify, on a seasonal basis, the life cycle and development stages of native plants across the BOA to determine the best strategy in order to collect seeds for future revegetation programs. The format of the seed assessments ensures that timely and prioritised seed collection is implemented, and that reporting includes spatial information required by seed collection contractors to undertake the required works. Seed collection will be based on seed assessment results and from other opportunistic observations, but the assessment, collection and propagation will only be undertaken as required depending on the revegetation needs.

Seed collection, management, propagation, storage and record-keeping will be undertaken in consideration of Greening Australia (various dates) *Florabank Guidelines* (http://www.florabank.org.au) and Conservation Agreement limitations and permissions. Currently accepted best practice, as described in Rawlings *et al.* (2010) for local provenance seed collection includes:

- Collection of seed from several source sites with similar rainfall, soil, altitude, aspect, and slope position to the revegetation site to ensure they are most adapted to the landscape and environmental conditions;
- Collection of seed from between 20-50 plants of each species for genetic diversity; and
- Collection of seed from plants spaced approximately three plant-heights apart to prevent collection of too many closely related seeds.

For seed collection undertaken on site; records will include the species, quantities, dates and locations (in consideration of Florabank Guideline 4 [1999]) and be reported.

5.5 REVEGETATION

The objective of the revegetation program is to increase the area, quality and connectivity of native vegetation and habitats, focusing on assisted natural regeneration and active revegetation methods including direct seeding or seedling planting with consideration given to Conservation Agreement conditions. The revegetation program was prepared following the principles outlined within *Florabank Guidelines* (Greening Australia, various dates) and *A Guide to Managing Box Gum Grassy Woodlands* (Rawlings *et al.,* 2010).

Natural regeneration will be favoured over planting or direct seeding in areas of native woodland/forest and derived native grassland (moderate to good condition) because natural regeneration conserves the natural genetic diversity of the local vegetation.

WHC will undertake annual revegetation assessments to identify across the BOA where natural regeneration is not occurring, as well as any underperforming previous revegetation areas to determine what and where any active revegetation or maintenance revegetation is required for the upcoming season of the annual revegetation program.

Annual revegetation assessments will be undertaken to restore self-sustaining woodland within existing areas of Box-Gum Woodland CEEC and derived native grassland and will consider key species required to match the target vegetation communities as well as natural or physical constraints to revegetation

In addition, annual revegetation assessments will consider key species required to match the mapped or adjoining suitable PCT vegetation communities as well as any natural or physical constraints to revegetation of individual paddocks across the BOA. The information from the annual revegetation assessments will be used to place seed and hiko seedling orders for the required quantity of tree, shrub and ground cover species. Orders will be placed in advance to allow sufficient time for additional seed collection (if required, **Section 5.4**) and for seedling germination/propagation to occur in time for the upcoming annual revegetation program. Flora species indicatively used in areas under active revegetation (**Table** 5.5) include a variety of grasses, shrubs and trees to create a structurally diverse habitat (including species associated for Box-Gum Woodland CEEC; and habitat for the Regent Honeyeater, Swift Parrot and Corben's Long-eared Bat). The annual revegetation program timing is to occur during periods of desirable seasonal conditions (times of opportunistic high soil moisture and moderate diurnal temperature variation).

Ground truthing and mapping of proposed revegetation paddocks will determine what preparation and maintenance works are required for individual revegetation paddocks. Ground preparation methods that can be implemented (where required) include weed control, grass competition maintenance, soil disturbance (i.e., augering, mounding, ripping, harrowing or ploughing) as well as consideration of other ancillary items (i.e. tree guards) that are required to optimise revegetation success and growth/development of seedlings and seeding areas. Post planting inspections will be undertaken progressively to survey performance/quality, methods and results to date including a final end of season survival count of the previous annual revegetation program. All these processes and steps allow progressive learning and adaptive management to be implemented as part of future revegetation programs (**Plate 1**).

Table 5-5: Indicative Revegetation Species List of Key PCTs within the BOA

Common Name	Scientific Name	Common Name	Scientific Name
Trees		Grasses	
Western Rosewood	*Alectryon oleifolius*	Kangaroo Grass	*Themeda triandra*
Red Ash	*Alphitonia excelsa*	Wallaby Grass	*Rytidosperma* spp.
Rough-barked Apple	*Angophora floribunda*	Plains Grass	*Austrostipa aristiglumis*
Whitewood	*Atalaya hemiglauca*	Barbed Wire Grass	*Cymbopogon refractus*
Kurrajong	*Brachychiton populneus*	Slender Bamboo Grass	*Austrostipa verticillata*
#White Cypress Pine	*Callitris glaucophylla*	Slender Rats Tail Grass	*Sporobolus creber*
#Belah	*Casuarina cristata*	Tall Oats Grass	*Themeda avenacea*
*#White Box	*Eucalyptus albens*	Silky Browntop	*Eulalia aurea*
#Apple Box	*Eucalyptus bridgesiana*	Shrubs and Sub-shrubs	
*#Blakely's Red Gum	*Eucalyptus blakelyi*	Western Silver Wattle	*Acacia decora*

Common Name	Scientific Name	Common Name	Scientific Name
#Narrow-leaved Ironbark	*Eucalyptus crebra*	Sticky Wallaby Bush	*Beyeria viscosa*
#River Red Gum	*Eucalyptus camaldulensis*	Sticky Hop-Bush	*Dodonaea viscosa* ssp. *angustifolia*
Tumbledown Red Gum	*Eucalyptus dealbata*	Wilga	*Geijera parviflora*
Dwyers Red Gum	*Eucalyptus dwyeri*	Black Tea-tree	*Melaleuca bracteata*
Silver-top Stringybark	*Eucalyptus laevopinea*	Forbs	
Red Stringybark	*Eucalyptus macrorhyncha*	Yellow Burr-daisy	*Calotis* spp.
#Silver-leaved Ironbark	*Eucalyptus melanophloia*	Common Everlasting	*Chrysocephalum apiculatum*
*#Yellow Box	*Eucalyptus melliodora*	Ruby Saltbush	*Enchylaena tomentosa*
#Western Grey Box	*Eucalyptus microcarpa*	Winter Apple	*Eremophila debilis*
Pilliga Box	*Eucalyptus pilligaensis*	Narrawa Burr	*Solanum cinereum*
Poplar Box	*Eucalyptus populnea*	Fuzz Weed	*Vittadinia* spp.
Manna Gum	*Eucalyptus viminalis*	Blue Bells	*Wahlenbergia* spp.

* Species associated with the Box-Gum Woodland CEEC to create structurally diverse habitat (as per the NSW Final Determination and Commonwealth Listing Advice for these communities). # Species associated with habitat for the Regent Honeyeater, Swift Parrot and Corben's Long-eared Bat.

Plate 1: Active Revegetation within Willeroi West BOA

5.5.1 Revegetation Works Completed

Revegetation works have been undertaken across the BOA as outlined in **Table 5.6** and **Figure 5.1**. The restoration commitments outlined below include areas of active revegetation and natural regeneration.

Table 5-6: Extent of revegetation works undertaken across the BOA

BOA	Restoration Commitment (ha) and relevant Approval	Total restoration completed to date	Extent Active Reveg (ha)	Extent Natural Regen (ha)	Area (ha) of new and/or maintenance plantings					
					2017	2018	2019	2020	2021	2022
Willeroi West	193 (MP11_0047)	250.8	131	119.8	0	88	116	0	0	0

Active revegetation extents (shown in **Table 5.6**) were quantified based on the actual extent of primary revegetation undertaken across the BOA. Differences between areas committed to in the relevant Approvals and the actual extent of active revegetation is identified through Annual Revegetation Assessments. Assessments to date have found that some areas originally committed to, were not suitable for revegetation due to; increased natural regeneration; unsuitably steep or rocky ground; the presence of remnant riparian or paddock trees; identification of heritage sites; identification of threatened flora species (and the erection of enclosures); and the presence of fence lines and access tracks.

Primary revegetation of the BOA is complete. Whilst active primary and secondary revegetation works are continuing, the BOA have exceeded the explicit restoration commitments within the relevant Approvals (**Table 5.6**).

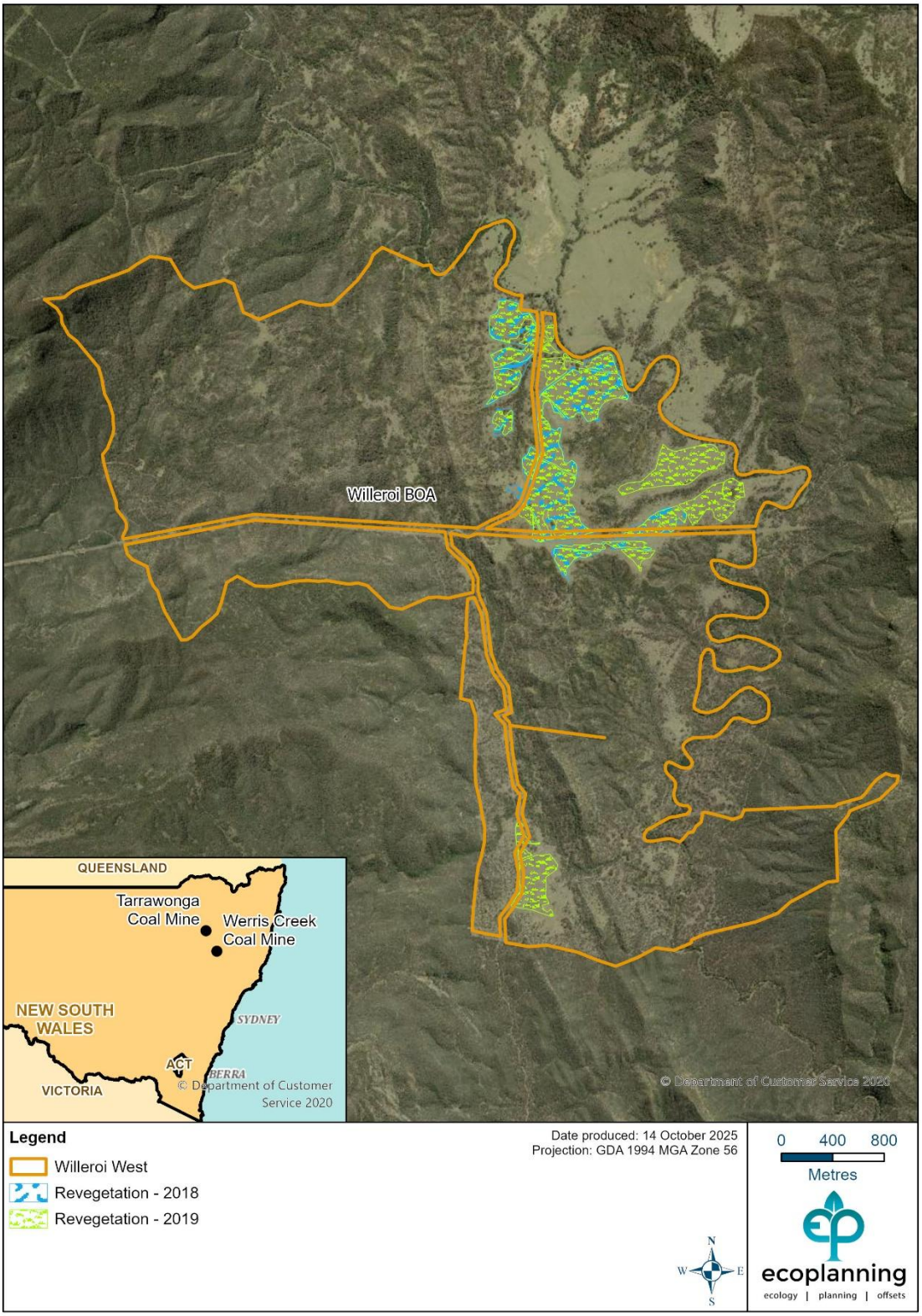

Figure 5.1: Revegetation works undertaken across the BOA

5.6 ECOLOGICAL THINNING

Ecological thinning will only be considered in habitats identified as having dense regrowth, in particular *Callitris* species. WHC will undertake ecological thinning assessments to identify areas across the BOA where dense regrowth is impacting on flora and fauna habitat condition or is adverse to natural regeneration/ecological restoration. Initial stages of the ecological thinning assessment concludes that ecological thinning of *Callitris* could not be justified at this point in time without further assessment. If further assessment determines that ecological thinning is required; it will be staged, reflective of existing flora and fauna habitat condition (in consideration of Conservation Agreement conditions).

5.7 HABITAT AUGMENTATION

Habitat augmentation (using salvaged resources or nest boxes) will be undertaken in accordance with Approval conditions and in habitats identified as having low habitat resources. Whitehaven will undertake habitat needs assessments to identify across the BOA where habitat resources are scarce, to determine the extent of habitat augmentation required. Habitat augmentation will be staged, reflective of existing fauna habitat condition and will utilise available salvaged resources such as coarse woody debris, rocky debris and artificial hollows (including nest boxes – the number and type determined by the habitat needs assessment based on signs of use and suitable dimensions required for species and data collected from clearing areas on mine sites) in consideration of Conservation Agreement conditions.

WHCs Habitat Augmentation program (AMBS draft 2021) estimated that approximately 2900 nest boxes were needed for these low habitat resource areas across all WHC biodiversity properties to address the calculated deficit for hollow bearing trees in poor/medium broad habitat types; with Tarrawonga Offset Areas having deployed 135 nest boxes (AMBS 2024c) (varying dependent on suitable trees, size of habitat augmentation corridors and prevailing conditions) utilising designs suitable for the range of target species appropriate to the habitat at the installation locations/corridors. WHCs commitment to ongoing monitoring will ensure that the habitat augmentation program can continue to be adaptive and reactively refined to match the actual restoration of fauna populations and species measured overtime

Where nest boxes are to be installed; they will be made from high quality and durable materials that provide for a long lifespan and of designs that are targeted for hollow-dependent threatened species known to occur in the locality of the offset site such as woodland birds, arboreal mammals and microbats.

A targeted monitoring program is implemented for the BOA with habitat augmentation to survey their use in conjunction with other fauna methods (**Section 5.15**). Monitoring includes targeted camera surveys and external/internal observations of habitat augmentation structures to identify both their use and condition.

5.8 HERITAGE MANAGEMENT

Biodiversity management of heritage sites and values is consistent with the relevant baseline surveys and mine site-specific Heritage Management Plans as well as the Aboriginal Heritage Conservation Strategy (AHCS) (University of Queensland, 2017 for TCM BOS). There is not expected to be any conflict between biodiversity management works in the offset areas and any cultural and historical heritage values and sites by adopting the following measures:

- Any new BOA should have heritage due diligence assessments completed prior to commencing biodiversity management works that cause surface disturbance. In addition, biodiversity management works (such as fire break track maintenance, revegetation ground preparation or infrastructure/asset removal) cultural and historic heritage site locations will be reviewed to avoid being impacted;

- Routinely maintain and update the Whitehaven Historical Heritage Register and Spatial Database (Whincop, 2021a) and the Whitehaven Cultural Heritage Register and Spatial Database (Whincop, 2021b);
- All relevant identified cultural and historic heritage sites within offset areas will be demarcated and fenced. To avoid inadvertent disturbance; heritage sites will have demarcation fencing installed and signs that identify the WHC BOA property, type of heritage and site ID, and a Whitehaven contact number provided so that only authorised access can be permitted and all activities must be authorised;
- All relevant identified cultural and historic heritage sites will have an Annual Heritage Site and Fencing Inspection undertaken by appropriately qualified heritage specialists to ensure the integrity of the fencing and site condition has not compromised and that heritage sites are appropriately managed;
- If any potential heritage sites, remains or artefacts are identified during biodiversity management; the work will immediately stop within the vicinity of the suspected area and appropriately qualified heritage specialists will be engaged and an assessment undertaken to determine what action and reporting is required. Offset areas will need to meet all statutory requirements under the NSW *National Parks and Wildlife Act 1974* and *NSW Heritage Act 1977*.

5.9 WEED MANAGEMENT

WHC aim to promote natural regeneration by reducing weeds so that perennial exotic plant cover (PEPC) does not comprise of more than 20% of flora monitoring plots (aligned with RBS-2 [Umwelt 2017]) by implementing measures aiming to exclude priority weed species listed in the *North West Regional Strategic Weed Management Plan* 2017 – 2022 (NWRSWMP) (LLS, 2017). Priority weed species relevant to the BOA include Weeds of National Significance (WoNS), High Threat Exotics (HTE) and weeds identified within the BC Act and EPBC Act as a Key Threatening Process (KTP).

WHC will manage weeds in accordance with the *NSW Biosecurity Act 2015* that introduced the 'General Biosecurity Duty' (GBD) which requires all land managers and users to ensure as far as is reasonably practicable, that biosecurity risks are prevented, eliminated or minimised. In addition to WHC's GBD responsibility; weed management will be implemented aligned with the NWRSWMP (LLS, 2017) and weed control measures will be guided by published control measures (e.g., DPI, 2018a). The NWRSWMP introduces a risk management approach (based on the weed invasion curve stages of prevention, eradication, containment and asset protection) to prioritise weeds for management based on those weeds that are 'State Level Determined Priority Weeds for the North West Local Land Services Region' and additional 'Regional Priority Weeds'.

The spread and introduction of weeds can be prevented by the practice of weed hygiene measures. WHC will instruct contractor vehicles and equipment entering the offset area (via toolbox talks and other communications including key messages) to be clean and free from weeds and/or seeds. Access to the offset areas will also be controlled as described in **Section 5.3**.

Seasonal weed assessment programs are undertaken across the offset area to identify weed species, extent and condition of any infestations and the opportunity for control/management depending on seasonal conditions. The weed assessments ensure that timely and prioritised weed control is undertaken on a seasonal basis, with information provided directly to contractors to enable targeted weed control and efficient use of resources across the BOA.

A number of environmental and priority weeds are known to occur in the offset areas as listed in **Table 5.7**. Based on seasonal weed assessment results; weed control will target priority weeds and any other environmental weed present in the BOA. If new priority weed species are found, then this will be communicated with WHC mine sites and neighbouring properties/organisations (via toolbox talks and other communications including key messages) and will also be managed in accordance with this OMP.

The Department of Primary Industries *NSW WeedWise* Website will be consulted prior to weed control, for recommended techniques for the removal of priority weeds. Relevant methods for controlling priority weeds known to occur in the offset areas are summarised in **Table 5.7**.

Table 5-7: Example Control Methods of Priority Weeds across the BOA

Common Name	Scientific Name	Example Control Methods (DPI, 2018a)[2]
Mother of Millions	*Bryophyllum delagoense*	herbicide application
Paterson's Curse	*Echium plantagineum*	herbicide application
Coolatai Grass	*Hyparrhenia hirta*	physically remove, herbicide application
African Boxthorn	*Lycium ferocissimum*	physically remove, herbicide application
Prickly Pear	*Opuntia* spp.	physical removal, herbicide application
Tiger Pear	*Opuntia aurantiaca*	physical removal, herbicide application
Sweet Briar	*Rosa rubiginosa*	physical removal, herbicide application
Fireweed	*Senecio* spp.	herbicide application
Cockle Burr	*Xanthium occidentale*	physical removal, herbicide application
Bathurst Burr	*Xanthium spinosum*	physical removal, herbicide application

All personnel involved in weed management will be required to hold relevant and valid licences/ permits for weed management works, including a chemical licence to use herbicides and a chainsaw certificate to operate chainsaws (where applicable).

5.10 PEST ANIMAL MANAGEMENT

The overarching objective of the pest animal management program is to ensure that the impacts of pest animals to native species, existing vegetation and revegetation within offset area are minimised. The goal of pest animal management is to achieve an overall reduction in pest animal species and population sizes targeted by control measures implemented across the BOA (in consideration of potential drought conditions and seasonal trends).

WHC aims to apply an even and consistent pest animal management effort by routinely scheduling a rolling monitoring and control programs across the BOA. This standardised approach can also be supplemented with periodic targeted programs that focus on specific areas with high pest animal detection, or, on species which have increasing rates of detection. Both the overall management and targeted programs are planned using data collected from grid based motion detection camera monitoring program, pest animal observations and the results of previous control programs.

Pest animal management will focus on the pest animals recorded from the offset areas (**Table 3.2**). However, if new pest animals are found, those new pest animals will also be managed in accordance with this OMP.

Control measures will be implemented by Pest Control Contractor(s) and/or WHC personnel as required. All personnel involved in pest animal control will be required to hold relevant and valid licences/permits, including any relevant chemical licences for pesticide use or a firearms licence for shooting. Pest animal control will be undertaken in consideration of the control recommendations outlined in the *Ecology and Management of Vertebrate Pests in NSW* (DPI, 2018b).

Table 5-8: Control Methods for Target Pest Animals

Common Name	Scientific Name	Example Control Method	Relevant Documents[2]
Feral Pig	*Sus scrofa*	trapping/ground shooting; and/or ground baiting.	*Threat Abatement Plan for Predation, Habitat Degradation, Competition and Disease Transmission by Feral Pigs* (DotEE, 2017); *PestSmart Toolkit* (Centre for Invasive Species Solutions, 2021); and *Ecology and Management of Vertebrate Pests in NSW* (DPI, 2018b).

Common Name	Scientific Name	Example Control Method	Relevant Documents[2]
Feral Goat	*Capra hircus*	trapping/mustering; and/or ground shooting.	*Threat Abatement Plan for Competition and Land Degradation by Unmanaged Goats* (DEWHA, 2008a); and *PestSmart Toolkit* (Centre for Invasive Species Solutions, 2021).
European Red Fox	*Vulpes*	trapping; and/or ground baiting.	*Threat Abatement Plan for Predation by European Red Fox* (DEWHA, 2008b); *NSW Threat Abatement Plan For Predation by The Red Fox (Vulpes vulpes)* (OEH, 2011); *PestSmart Toolkit* (Centre for Invasive Species Solutions, 2021); and *Ecology and Management of Vertebrate Pests in NSW* (DPI, 2018b).
European Rabbit	*Oryctolagus cuniculus*	warren ripping/fumigation; ground shooting; and/or ground baiting.	*Threat Abatement Plan for Competition and Land Degradation by Rabbits* (DotEE, 2016)*; PestSmart Toolkit* (Centre for Invasive Species Solutions, 2021); and *Ecology and Management of Vertebrate Pests in NSW* (DPI, 2018b).
Brown Hare	*Lepus capensis*	ground shooting.	*Integrated Hare Control* (Department of Environment and Primary Industries [VIC], 2015); and *Ecology and Management of Vertebrate Pests in NSW* (DPI, 2018b).
Feral Deer	*Cervus spp., Axis spp., or Dama spp.*	ground shooting.	*Feral Deer* (SEWPaC, 2011); and *Ecology and Management of Vertebrate Pests in NSW* (DPI, 2018b).
Feral Cat	*Felis catus*	trapping; and/or ground shooting.	*Threat Abatement Plan for Predation by Feral Cats* (DotE, 2015); *PestSmart Toolkit* (Centre for Invasive Species Solutions, 2021); and *Ecology and Management of Vertebrate Pests in NSW* (DPI, 2018b).
Wild Dog	*Canis familiaris*	ground baiting; and/or ground shooting.	*New South Wales Wild Dog Management Strategy 2017-2021* (DPI, 2017); *PestSmart Toolkit* (Centre for Invasive Species Solutions, 2021); and *Ecology and Management of Vertebrate Pests in NSW* (DPI, 2018b).

[1]*Local Land Services Act 2013*

[2]An alternative published method may be used as required.

5.11 EROSION MANAGEMENT

Erosion management is determined by annual inspection programs of known soil degradation (erosion and/or salinity) sites, unsealed tracks and associated drainage structures across the BOA to review appropriate erosion and sediment control measures required in accordance with the Blue Book (*Managing Urban Stormwater: Soils and Construction Volume 1* [Landcom, 2004]) and in consideration of Conservation Agreement conditions. Should annual inspection programs identify areas of unstable and active erosion or salinity, the soil erosion register will be updated including what (if any) active remediation works are required to be undertaken. Any erosion and sedimentation identified with tracks and associated drainage structures will be maintained through annual fire break track maintenance program.

5.12 AGRICULTURE MANAGEMENT

Agriculture/grazing has been excluded from the offset areas. Stray neighbouring stock will be removed as soon as practicable. Any proposed grazing for high threat weed infestations must be planned in consideration of Conservation Agreement conditions and aligned with the *Biodiversity Conservation Trust Livestock Grazing Guidelines* (BCT, 2021).

5.13 BUSHFIRE MANAGEMENT

WHC will annually quantify bushfire fuel loads and characterisation of the BOA to assess bushfire hazard of various Offset properties prior to each bushfire season. The assessment will consider human, environment and infrastructure assets within and adjacent to offset areas to quantify an overall bushfire risk, then the feasibility of various hazard reduction methods are considered (for example but not limited

to fire exclusion, mechanical fuel reduction such as slashing or undertaking ecological burns) prior to determining annual treatment/actions for each offset property.

Offset properties with moderate to high overall bushfire risks will be prioritised as part of an annual ecological burn program and will be subject to conceptual and strategic fire planning and mapping. Once annual fire planning has identified paddocks feasible to undertake ecological burns, and a burn plan has been prepared, WHC will consult, where required, with relevant stakeholders such NSW Rural Fire Services (RFS), Councils and neighbours/local community as well as NSW Environmental Protection Authority (EPA Approval for Open Burning is required for ecological burns) and NSW Biodiversity Conservation Trust (BCT) in consideration of Conservation Agreement conditions.

WHC will establish and maintain Access Tracks within the BOA and around the perimeter of the BOA that will serve a dual purpose to passively mitigate fire spreading within or outside of the offset property (where practicable) and containment for bushfires and active ecological burns (as required). Access Tracks will be periodically maintained as zero fuel barriers (preferably mineral earth barriers up to 6 m total width of clearing in accordance with Conservation Agreement Part 3 Tracks and Infrastructure and Part 4 Clearing and Earthwork Envelopes and as per WHCs obligations under CA0060); acknowledging that between maintenance events some fuel accumulation will occur, not to NSW RFS Fire Trail Standards (November, 2023). Access Tracks will be inspected annually, prior to the fire season (RBS-2, Umwelt, 2017), and maintenance of Access Tracks to be prioritised as required by the inspection.

WHC will undertake an annual ecological burn program of paddocks/burn blocks identified through the above assessment, within the prioritised offset properties, using suitably experienced and capable professionals with adequate firefighting resources and training to safely and competently light and extinguish ecological burns. The location of ecological burns within grasslands (if previous revegetation present, will need to be sufficiently mature to avoided fire impacts) and existing remnant vegetation will be in consideration of Conservation Agreement and will align with fire intervals outlined by the Bush Fire Coordinating Committee (2008) summarised as:

- intervals for grassy woodlands of 8 to 40 years;
- grasslands 3 to 10 years; and
- dry sclerophyll forest shrub/grass sub-formation of 8 to 50 years.

Ecological burns will aim for low to moderate fire intensity burns, by aiming for cool-season burns, when conditions are suitable (generally autumn to spring) to establish a mosaic of different burn ages and fuel loads. In addition, other burn preparations will be undertaken to mitigate impacts to environmental assets (such as hollow bearing trees) and other constraints identified within mapped burn blocks.

In the event of a bushfire within or adjacent to the BOA; WHC will assist bushfire emergency services and neighbours (such RFS, NPWS and Forestry Corporation NSW) as much as practicable, including but not limited to coordinating access to the BOA as well as facilitating available water sources. The locations of previously undertaken ecological burns and historic burn scar mapping is shown in **Figure 5.2**. WHC will add flora monitoring plots to previously burnt areas to monitor the restoration response and ecological burn treatment management (particularly for BGW).

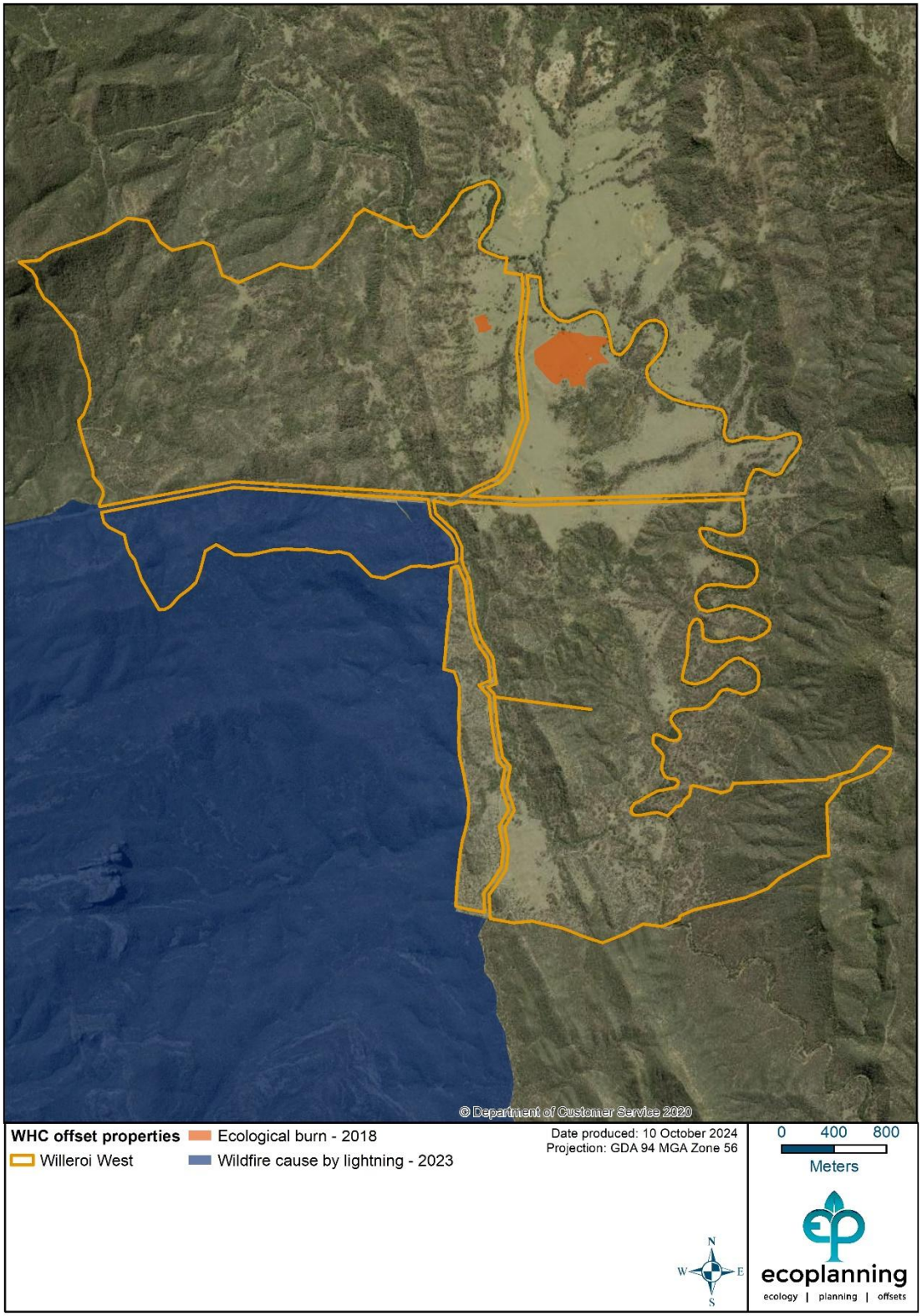

Figure 5.2: Ecological burns within the Willeroi West BOA

5.14 FLORA MONITORING

Purpose

Annual flora monitoring will be undertaken by qualified ecologists to gather floristic data that can track changes in vegetation and habitat values within the BOA and report on the effectiveness of management actions and progress made against annual performance and final completion criteria (**Section 5.16**). Flora monitoring will be on an annual basis in spring, when the highest diversity of plants is expected to be present (Rawlings *et al.,* 2010). The season of monitoring plots will be consistent (not rotated) in order to monitor trends in the data and that a similar range of species diversity has been found in other seasons (AMBS, 2020) not warranting seasonal surveys.

Monitoring Design

Relevant ecological indicators outlined in **Table 5.9**, based on a modified BioBanking Assessment Methodology (BBAM) (OEH, 2014) are monitored annually at treatment plots (within the BOA) and compared to control plot and reference site data (both outside the BOA) over time.

All monitoring plots (treatment, control and reference) are 0.1 ha (20 x 50 m) inclusive of a 20 x 20 m floristic plot and 50 m transect (see **Figure 5.3**).

To determine whether the ecological management objectives are being achieved, the flora monitoring program aims to collect data that can answer four ecological questions:

1) Do Vegetation Zones (VZs) meet completion criteria?
2) Do treatment plots meet annual performance criteria?
3) Are treatment plots trending towards completion criteria and/or reference state?
4) To what extent are management actions within a vegetation zone effective?

The annual reporting requirements for flora monitoring results are outlined in **Section 6.2**.

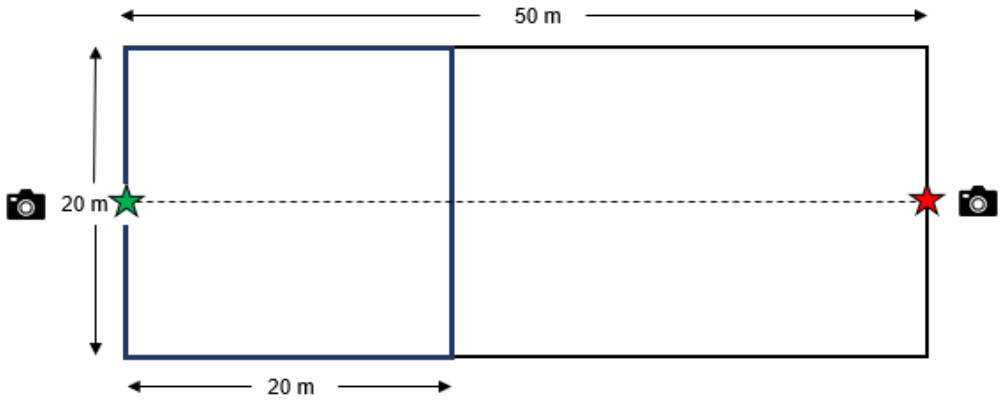

Figure 5.3: 20m x 50m monitoring plot – green star represents start of transect

Table 5-9: Flora monitoring attributes

Monitoring attributes (Ecological indicators)		Assessment technique	BGW condition indicators	Threatened Fauna Habitat value indicators
Native plant species richness (NPS)		Count utilising a species list recorded within 20 x 20m sub-plot (estimate % cover and abundance of each species)	✓	
Native over storey cover (NOS)		10 points along a 50 m transect	✓[1]	✓
Native mid-storey cover (NMS)		10 points along a 50 m transect	✓	
Native ground cover (grasses) (NGCG)		50 points along a 50 m transect	✓	
Native ground cover (shrubs) (NGCS)		50 points along a 50 m transect	✓	
Native ground cover (other) (NGCO)		50 points along a 50 m transect	✓	
Exotic plant cover (EPC) (calculated as % of total ground and mid-storey cover)	mid-storey cover	10 points along a 50 m transect	✓	
	ground cover	50 points along a 50 m transect		
Number of standing trees (dead and alive) with hollows (NTH)		Count within 20 x 50 m plot	✓	✓
Proportion of over-storey species occurring as regeneration (OR)		Observation within 20 x 50 m plot (compared to number of native overstorey species occurring within 50 m radius of plot)	✓	
Total length of fallen logs (FL)		Measured within 20 x 50 m plot	✓	✓
Exotic plant species richness		Count utilising a species list recorded within 20 x 20m sub-plot (estimate % cover and abundance of each species)		
Perennial exotic plant cover (PEPC)		% foliage cover recorded within 20 m x 20 mm sub-plot	✓	
Photo points		2 transect photos per plot, taken at chest height from start and end picket	✓	
Cypress pine stem counts (Willeroi West only)		Count number of Cypress Pine stems within height classes (<1m, 1-2m, 2-5m, 5-10m, 10-15m, 15-20m, 20-25m) within 20m x 20m sub-plot		
Opportunistic observations		Record observations of: natural regeneration of disturbed areas, threatened species, fire events, weeds, pest animals, visitor impact, rubbish, other field notes	✓	✓

[1]Indicator of water stress

The BOA is mapped and stratified into Vegetation Zones (VZs) (shown in **Figure 5.4**) which define areas having the same annual performance criteria, final completion criteria and exposure to BOA adaptive management actions. VZs within the BOA are defined based on:

1) Vegetation Class (Keith 2004) (known herein as Keith Class), and

2) Broad condition state (Good, Semi-cleared, DNG/Cleared)

Treatment plots are established in the largest VZs, where the majority of WHC management actions occur, and are replicated based on Biobanking Assessment Method (BBAM) area threshold recommendations (OEH 2014). The number of treatment plots within the BOA is shown in **Table 5.10**. Locations of treatment plots are outlined in **Appendix E** and displayed in **Figure 5.4**.

Table 5-10: Number of flora monitoring plots within the BOA

BOA	Area (ha)	No. VZs to be monitored	No. treatment plots
Willeroi West	1660.03	4	25

Control plots are used to monitor the effectiveness of BOA management actions and are located outside the BOA in DNG and/or semi-cleared areas, within the same Keith Class and IBRA region as the treatment plots to which they are compared. Control plots are situated on land representing a 'business as usual' land management scenario (BCT 2021), where no WHC biodiversity management occurs. Where it is not possible to establish control plots in the same IBRA and Keith Class as treatment plots, control plots within the adjoining IBRA will be used. The comparison of treatment and control plot data aims to account for changes that occur due to background environmental change and indicate whether WHC management actions are effective within each VZ.

Reference plots are located within a 'reference site' outside of the BOA, representing high-quality remnants of Keith Classes monitored within the BOA. The monitoring of reference sites provides local benchmark data for aspirational 100-year targets, achievable beyond WHCs period of management. The comparison of VZ data (with relatively short management history) to the appropriate reference site, is to show that under WHC management VZ restoration is trending towards reference site condition. This gives confidence that it will continue to trend towards reference condition after achievement of completion criteria and the WHC management period ends.

Control and reference sites are to have a minimum of three plots to allow for statistically robust data analysis. Treatment and control plots are permanently marked with star pickets at the start and end of the 50 m transect and at the four corners of the 20 m x 20 m floristic plot. Reference plots will not be permanently marked as they are within public land. The location of the start and end of the 50 m transect have been recorded using a GPS. **Figure 5.5** shows the location of the control and reference sites surveyed in parallel with the treatment plots as part of Spring Flora Monitoring.

Bushfire treatment plots

Two bushfire treatment plots have been installed in Willeroi West following a bushfire event in March 2023 (see **Figure 5.2** for extent of burn scar). This is in response to the requirements of the Leard Forest Regional Biodiversity Strategy Stage 2 – Strategy Report (RBS-2; Umwelt, 2017), Table 2.2, Section 4.2, which states *"In habitat restoration areas and regeneration/revegetation zones, monitoring will be required to record the response to a fire event and guide the need for potential active and adaptive management."*. The location of these plots are displayed in **Figure 5.4**.

Data recording and storage

WHC utilises an online/electronic application as the Flora Monitoring Database and Reporting tool. The online application is a custom-designed application, accessible in the field via a tablet or smart phone which is used to electronically record floristic and habitat biometric data. Once the data is uploaded from the field it is stored and visible via a web-based login. The biometric data is stored in the electronic database and can be downloaded as Excel spreadsheets.

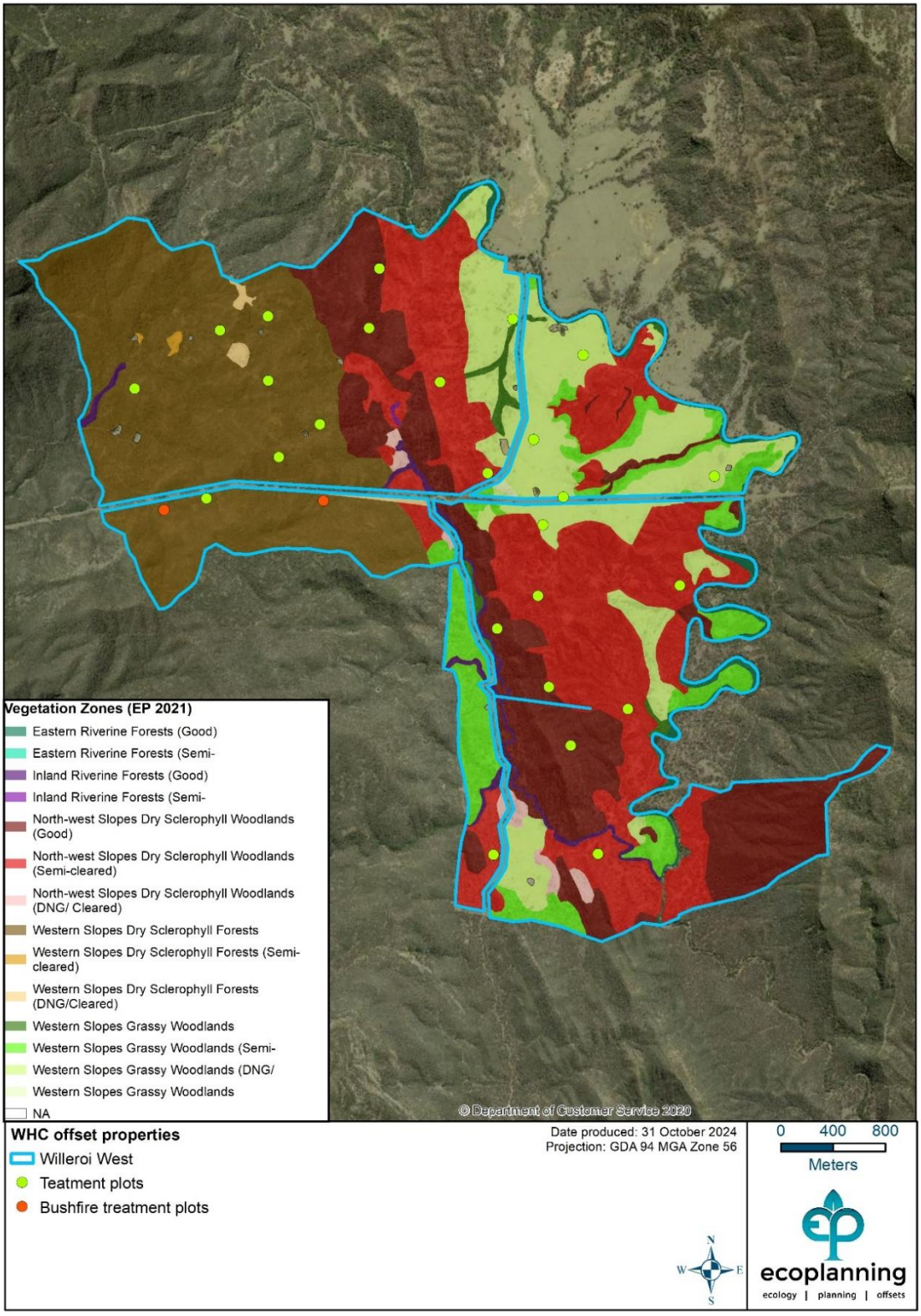

Figure 5.4: Vegetation zones and monitoring plot locations within Willeroi West BOA.

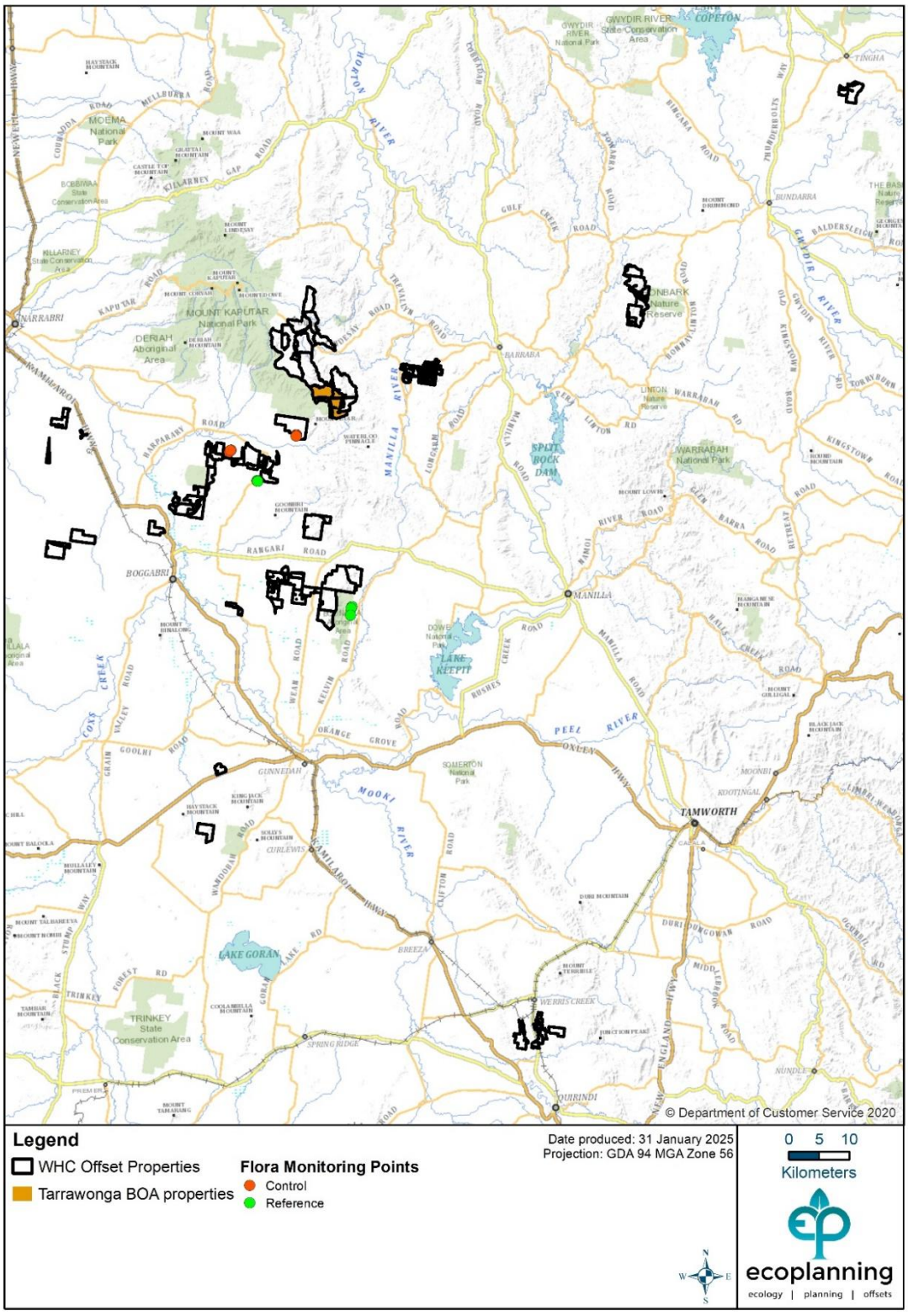

Figure 5.5: **Location of control and reference plots associated Willeroi West BOA.**

5.15 FAUNA MONITORING

A 5-year review of the data collected from the Maules Creek and Willeroi Offset Annual Fauna Monitoring Programs surveyed between 2015 and 2019 (AMBS 2020a) indicated that while general trends in species richness and abundance over time were detected by the current survey methodologies and survey effort, the variance in the data set was extremely high and no meaningful statistical analysis linking changes in species richness and abundance to specific variables was possible. A further review was undertaken for all fauna monitoring methodologies and survey designs used across all WHC BOAs (AMBS 2020b) that identified the existing methods were somewhat effective at detecting fauna species richness and abundance, however there were aspects of each monitoring design and methodology that were contributing to high levels of variance in the data set. The previous monitoring design was struggling to deal with the spatial challenges associated with the large area of BOAs required to be monitored by WHC and the associated variables that were generated as a result of the large area. While the methods would continue to generate indicative species richness and abundance data sets, the data sets would not be sufficiently robust to link changes with specific variables including the management actions currently being undertaken by WHC.

Given the challenges faced by the monitoring projects managed by WHC and the strong desire of WHC to generate statistically robust data on the response of fauna assemblages to biodiversity management strategies; a series of structural modifications to the monitoring programs were implemented. The modifications to survey design and methods were selected after undertaking a thorough review of peer reviewed literature and consulting academic and industry experts in the fields of fauna that were being targeted. The modifications aimed to increase the likelihood that informative data on the influence of biodiversity management actions would be collected. The recommended modifications focused on adjustments to the timing of surveys, the number of survey sites, the number of replicates undertaken at each site, the area focused on by the surveys, and the methodology of the surveys. Specific modifications included:

- Changing the frequency of sampling for some monitoring components from annual to biennial, with the purpose of pooling resources for other structural survey modifications such as increasing the number of survey sites and increasing the number of replicates at each site;
- Designing sites to target specific fauna groups rather than having generic sites focusing on all fauna groups.
- Using the focus on target groups to select appropriate seasons for each survey (i.e. bird surveys conducted early spring independent of microbat surveys which are conducted in summer)
- Selecting sites that better sampled revegetation and non-revegetation treatments
- Targeting surveys on spatially explicit focus areas representative of the broader habitat variability of the BOA but likely to show detectable responses to biodiversity management actions that are influencing fauna response while maximising the chance of revealing total BOA species richness.

Annual monitoring of fauna has therefore been divided into a series of targeted programs focusing on specific fauna guilds. The surveys are primarily designed to detect changes in species richness and abundance over the duration of the management of each property by WHC. In addition to this overall aim, the monitoring program will attempt to evaluate guild and species level responses to revegetation programs, habitat augmentation and pest animal management. The ecological management objectives relevant to the purpose of fauna monitoring are:

- Protect and enhance existing woodland and forest habitat for Regent Honeyeater and Swift Parrot
- Protect and enhance existing woodland and forest habitat for Corben's Long-eared Bat

- Protect and enhance existing woodland and forest habitat for Superb Parrot
- Restore self-sustaining woodland and/or forest within derived native grasslands and 'non-native/Cleared' areas to provide habitat for the threatened species listed under the BC Act and EPBC Act

Each survey method will target spatially explicit focus areas. The focus areas were designed to incorporate a matrix of remnant woodland, naturally regenerating woodland and revegetated woodland. As such, properly stratified survey designs should allow for a robust evaluation of fauna assemblage responses to revegetation program by comparing detection to other, non-revegetated habitats. The focus areas are different sizes and in different locations for each fauna guild. The location of all fauna monitoring sites for the BOA are shown in **Figure 5.6**.

5.15.1 Diurnal Bird Surveys

Diurnal bird surveys will be undertaken within target focus areas with the surveys conducted late winter into spring. Each bird survey focus area has been divided into grid areas, with one bird survey site placed within each grid. Bird surveys will be undertaken using a fixed time/area rapid survey design with survey site boundaries defined by having fixed start and end points. Counts of birds will be made for "in plot", "outside plot, same habitat", and "outside plot, different habitat". Survey effort will vary across a biennial schedule. In year one, all sites will be surveyed up to five times and in year two, sites will be surveyed twice. Surveys will be spread between morning and afternoon survey windows, and if possible, on non-consecutive days.

5.15.2 Microbat Surveys

Microbat assemblages will be monitored using a combination of echolocation recorders and harp traps. Echolocation surveys will target focus areas with each microbat focus area divided into a standardised grid appropriate for each focus area. One echolocation recorder will be placed within each grid and units deployed to start recording 30 minutes before last light and will stop recording 2 hours after last light. Survey effort will vary across a biennial schedule. Most sites will be surveyed once every two years while a selection of sites will be sampled annually to act as a control.

In addition, harp traps will be deployed on the BOA as a component of a broader targeted survey program focusing on monitoring Corben's Long-eared Bat (*Nyctophilus corbeni*) in parallel with other WHC offsets to EPBC Approval 2011/5923 requirements for this MNES consistent with the *Survey Guidelines for Australia's Threatened Bats* (DEWHA 2010a). Surveys will be undertaken annually, with each harp trap site comprised of at least one harp trap to sample revegetated habitats. All harp traps will be moved to a new location within the focus area after each survey night. All bats captured will be processed during the day and released the night following the morning of capture. Non-target bat species will also be identified to species level (where possible), and have their sex, age and breeding condition noted.

5.15.3 Pitfall and Funnel Trap Surveys

Ground dwelling fauna will be monitored using grids of pitfall traps and funnel traps. Pitfall and funnel trap surveys will be conducted biennially within target focus areas. Pitfall trap arrays will be deployed at each focus area with sites paired between remnant woodland areas and revegetated areas. Revegetated areas will further be paired between augmented habitats and non-augmented habitats. Each pitfall trap array will consist of pitfall traps and funnel traps. Pitfall traps will be plastic buckets with lids dug into the ground. Each bucket will be joined by a drift fence. When the sites are open, the lid will be perched above the bucket to provide shade. Funnel traps will be covered with reflective shields or vegetation to ensure trapped fauna can thermally equilibrate. Trap girds, when open, will be checked in the morning and evening. Sites have been selected to evaluate the response of fauna to revegetation and habitat augmentation through the provision of coarse woody debris and rocks.

5.15.4 Motion Detection Camera Survey

A network of motion detection camera sites have been established across all BOAs for the purpose of native and pest animal monitoring (**Figure 5.6**). Site selection was designed on an area grid to maximise the even spread of cameras across the entire area of the BOA with a portion of the motion detection cameras to specifically inform pest animal management (**Section 5.9**). The remaining cameras will be activated annually to target native vertebrate fauna. Motion detection camera survey data will be analysed for the following purposes:

1. Native Fauna – Cameras will be used to detect other native species that don't already have targeted survey methods for and will aim to identify longer-term trends in native animal species richness;

2. Pest Animals – Separate to the monitoring for pest animal management, data will be analysed to identify longer-term trends in pest animal occupancy and identify interaction with native fauna trends.

Cameras activated annually will use bait stations comprising of an enclosed PVC pipe on a small star picket with the other cameras to focus on animal activity points.

Separate to the permanent motion detection camera surveys; WHC habitat augmentation installation areas will be monitored using cameras as follows:

1. Nest Boxes – the results of annual ground-based inspections and 5 yearly direct inspections (either climbing or pole cameras to look inside boxes) will inform where and what boxes are to be targeted with seasonally based camera surveys;

2. Coarse Woody & Rock Debris piles – Annual ground-based inspections will inform where and what piles are to be targeted with seasonally based camera surveys.

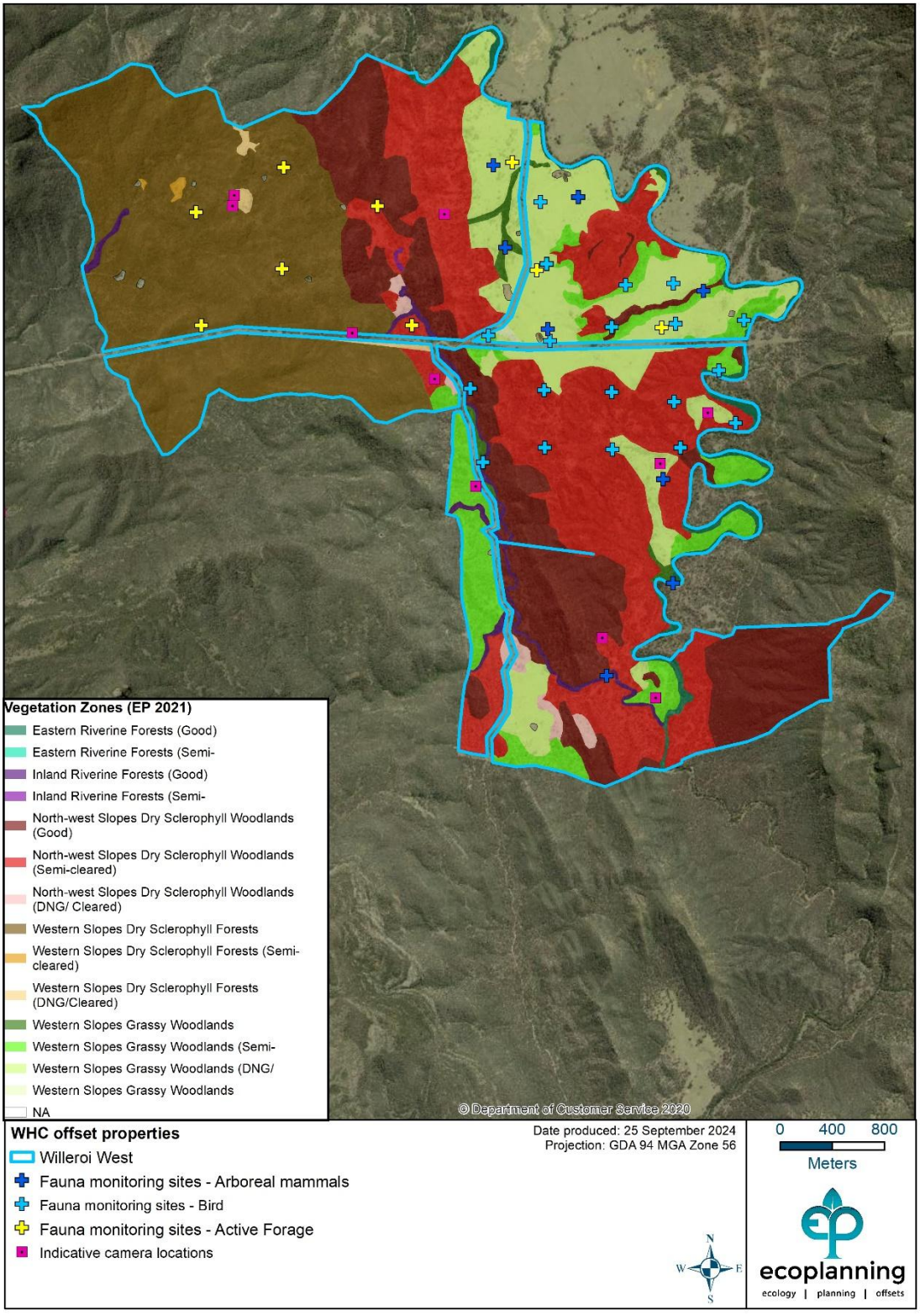

Figure 5.6: Fauna monitoring sites and motion camera locations within the Willeroi West BOA.

5.15.5 Winter Bird Survey

The ongoing monitoring for the Regent Honeyeater and Swift Parrot will be undertaken between May and August, coinciding with the likely flowering period for winter-flowering Eucalypts, such as White Box across all WHC BOAs. The monitoring program is designed to detect and confirm presence (or absence) of Regent Honeyeater and Swift Parrot in targeted areas with flowering resources to identify the use over time.

The monitoring program is summarised as follows:

1. Trigger point for survey – Starting May each year, relevant personnel will report on any observed presence of Winter flowering eucalypts. This will provide a trigger to initiate the scoping survey. If no trigger is provided, scoping survey to be initiated by the last week in July.
2. Scoping survey – Ecologists traverse the study area noting indicators for survey, such as, flowering eucalypts and/or congregations of nectar feeding birds. Linear, well-connected patches will also be noted. Flower intensity score and patch quality to be used to inform subsequent surveys.
3. Field survey – Ecologists to traverse the study area and conduct bird surveys at previously identified sites (as in the Scoping survey above). Survey effort will be guided by the intensity score at a site. At each site, flowering intensity scores are to be recorded and all bird species (sighted or heard) are to be recorded. A total survey effort cannot be prescribed because this is ultimately dependant on flowering intensity in any one year. However, to meet Commonwealth survey guidelines for targeted surveys (DEWHA 2010b), there will be a minimum of 20 hours of bird surveys across 8 days targeted to sampling winter flowering species across all Whitehaven offset areas.

The selection of survey locations for the field survey will prioritise high blossom areas within or adjoining known preferred habitat areas (such as high quality riparian areas although riparian Casuarina species and presence of Mistletoe are essentially a summer resource); presence of positively correlated species and absence of negatively correlated species like despotic/aggressive honeyeater species; and consider previous sighting records as well as the existing mapped and potential habitat areas for these species (**Section 4.3**). The existing Winter Bird Survey timing overlaps with the commencement of Regent Honeyeater breeding season; as well as overlapping with the Diurnal Bird Surveys (**Section 5.15.1**), replicating the high survey effort within or adjoining known preferred habitat areas during the breeding season. This will further extend the probability to detect this species.

The application of the above method targeted to the location of and timing for winter flowering trees will enable increased survey effort for nectivorous birds during the optimum seasonal conditions increasing the chance of detection for rare species like Regent Honeyeater and Swift Parrot.

5.16 PERFORMANCE AND COMPLETION CRITERIA

Using SMART principles (outlined below), WHC have defined site-specific final completion and annual performance criteria. These criteria provide quantified metrics to measure (within the BOA) the trajectory toward all relevant ecological management objectives i.e.:

- The restoration of BGW CEEC within existing BGW DNG,
- The restoration of woodland and/or forest within DNG and non-native/Cleared areas,
- The protection and enhancement of existing BGW (woodland form),

- The protection and enhancement of existing woodland and forest habitat for threatened species

SMART principles as outlined in Section 2.1.3 of the RBS-2 (Umwelt 2017) are as follows:

- **S**pecific – specific outcomes relevant to biodiversity matters (i.e., specific biometric attributes);
- **M**easurable – include quantifiable performance measures that can be compared over time (i.e., specific numeric and temporal values for the biometric attributes);
- **A**chievable – realistic goals that can be compared to baseline information (i.e., linked to NSW state-wide benchmark data);
- **R**elevant – outcomes are directly relevant to the biodiversity matter (i.e., biometric attributes directly influenced by management to measure condition either for protection/maintenance or improvement/restoration over time)
- **T**imely – includes specific timeframes for the completion of the outcome (i.e., timeframes align with approval based required management periods).

Performance criteria are interim yearly targets for assessing the performance of WHC Biodiversity management activities at plots, while completion criteria are the desired targets to be attained across a VZ, then maintained (at or above the desired target) averaged across five years. Once achieved; completion criteria indicate that management has been successful at obtaining the desired result towards woodland ecological restoration and annual monitoring can cease. WHC can revise the management descriptions/actions to reflect the lower intensity management required until the end date of the relevant approval has been reached.

Performance and completion criteria have been defined for selected monitoring attributes (shown in **Table 5.11**) that best assess the trajectory toward ecological management objectives. The monitoring attributes below have been selected as they can directly measure the outcome of biodiversity management being implemented towards restorations of the relevant PCT vegetation/endangered ecological communities and are also suitable as surrogates for monitoring improvements over time to woodland and forest habitat quality for key fauna threatened species (such as Regent Honeyeater, *S*wift Parrot and Corben's Long-eared Bat as per relevant Approvals).

Table 5-11: Performance and completion criteria for selected monitoring attributes

Monitoring attribute/ Ecological Indicators	Management Objectives	Performance criteria	Completion criteria
Native plant species richness (NPS)	Protect and enhance existing Box-Gum Woodland CEEC (woodland form).	Native species diversity trending towards benchmark range for the relevant Keith Class (**Appendix C**)	Native species diversity at or above benchmark value for the relevant Keith Class (**Table 5.12**)
Native over storey cover (NOS)	Restore self-sustaining woodland within existing areas of Box-Gum Woodland CEEC (derived native grassland).	Native overstorey cover trending towards benchmark range for the relevant Keith Class (**Appendix C**)	Native overstorey cover within benchmark range for the relevant Keith Class (**Table 5.12**)
Native mid-storey cover (NMS)	Restore self-sustaining woodland and/or forest within derived native grasslands and 'non-native/Cleared' areas to provide habitat for the	Native mid-storey cover trending towards benchmark range for the relevant Keith Class (**Appendix C**)	Native mid-storey cover within benchmark range for the relevant Keith Class (**Table 5.12**)
Native ground cover (grasses) (NGCG)		Native grass groundcover trending towards benchmark range for the relevant Keith Class (**Appendix C**)	Native groundcover grass cover within benchmark range for the relevant Keith Class (**Table 5.12**)

Perennial exotic plant cover (PEPC)	listed threatened species listed under the EPBC Act.	An overall decrease in weed cover compared to the previous year.	Perennial weed cover is less than 20% on average across plots

The benchmark ranges for key biometrics NPS, NOS, NMS and NGCG are sourced from the *BioMetric Vegetation Condition Benchmarks* (OEH, 2017) (**Table 5.12**). These benchmarks are relevant as these were in place at the time of the original Approval and therefore are compatible with the baseline data, subsequent monitoring data, and data collected by WHC in other company-owned offset areas which is based on BBAM (OEH, 2014). These benchmarks have an upper and lower threshold value.

Table 5-12: Key biometric completion criteria values for Keith Classes within the BOA

Keith Class	Relevant PCTs	Completion criteria (based on BVT benchmark values [OEH, 2017])			
		NPS	NOS	NMS	NGCG
North-west Slopes Dry Sclerophyll Woodlands	563, 588, 589, 594, 1308	26	6-25	6-25	20-30
Western Slopes Grassy Woodlands	1383	23	6-25	0-5	30-40
Western Slopes Dry Sclerophyll Forests	592	30	25-40	6-25	20-30

Annual performance criteria in **APPENDIX C:** are calculated by back-extrapolating lower and upper threshold completion criteria over 20 years to Year 0. Analysis of annual performance data aims to track progress towards the vegetation management objectives and allows for timely intervention with remedial action. Plots that fall below upper or lower threshold annual performance criteria will trigger a review of contingency measures as outlined in **Section 5.17**.

5.17 POTENTIAL RISKS AND CONTINGENCY MEASURES

5.17.1 Contingency Measures

The following Biodiversity Trigger, Action, Response Plan (TARP), consistent with RBS-2 Table 2.4 (Umwelt, 2017), has been aligned to the performance and completion criteria outlined in **Section 5.16**. The TARP shown in **Table 5.13** provides trigger points for contingency measures (corrective actions) to be implemented if the flora monitoring program outlined in **Section 5.14** identifies that performance criteria outlined in **Section 5.16** are not being met. Contingency measures may not be limited to those listed.

Table 5-13: WHC Biodiversity Trigger, Action, Response Plan (TARP)

Aspect	Trigger	Action/Response
Recruiting canopy species	Recruiting canopy species do not meet completion criteria across Good, or Semi-cleared VZs after 10 years following offset establishment	Review factors leading to below benchmark performance. Evaluate whether additional management (i.e., targeted removal of weeds, pest animal control, thinning, burning and/or supplementary planting of seedlings) is required.
	Recruiting canopy species do not meet completion criteria across DNG/Cleared VZs after 15 years following offset establishment	Review factors leading to below benchmark performance. Evaluate whether additional management (i.e. targeted removal of weeds, pest animal control, thinning, burning and/or supplementary planting of seedlings) is required.

Aspect	Trigger	Action/Response
EPBC conformance	BGW treatment plots do not meet completion criteria after 10 years following offset establishment	Review factors leading to below benchmark performance. Evaluate whether additional management (i.e., targeted removal of non-characteristic species and weeds, following supplementary planting with seedlings and/or seed) is required. Consider additional monitoring to examine the establishment of seedlings and seed.
Native species richness (NPS)	1st TIER – Offset treatment plots are below 80% annual performance benchmark following offset establishment	Review factors leading to below benchmark performance. Evaluate whether supplementary planting of appropriate seedlings or seeding is required.
	2nd TIER – Offset treatment plots are below 100% annual performance benchmark value but above 80% annual performance benchmark following offset establishment	Determine whether NPS is increasing or decreasing. If decreasing, investigate factors leading to decrease and monitor for further change.
Native overstorey cover (NOS)	1st TIER – Offset treatment plots are below lower annual performance criteria following offset establishment	For revegetation younger than five years – no action required, continue to monitor. For revegetation older than five years – Review factors leading to below benchmark performance. For revegetation older than five years – Evaluate whether supplementary planting of appropriate seedlings is required.
	2nd TIER – Offset treatment plots are above upper annual performance criteria following offset establishment	Review factors leading to above benchmark performance such as BVT/PCT assigned to the treatment plot and/or VZ. If shown to be an increasing trajectory overtime, evaluate whether additional management is required.
Native mid-storey cover (NMS)	1st TIER – Offset treatment plots are below lower annual performance benchmark following offset establishment	Review factors leading to below benchmark performance. Evaluate whether supplementary planting of appropriate seedlings is required.
	2nd TIER – Offset treatment plots are above upper annual performance benchmark following offset establishment	Review factors leading to above benchmark performance such as BVT/PCT assigned to the treatment site and/or VZ. Evaluate whether additional management is required.
Native groundcover – Grass (NGCG)	1st TIER – Offset treatment plots are below lower annual performance benchmark following offset establishment	Review factors leading to below benchmark performance. If shown to be an increasing trajectory overtime, evaluate whether additional management (i.e., supplementary seeding or weed control) is required.
	2nd TIER – Offset treatment plots are above upper annual performance benchmark following offset establishment	Review factors leading to above benchmark performance such as BVT/PCT assigned to the treatment site and/or VZ. Evaluate whether additional management (i.e., burning) is required.
Perennial exotic plant cover (PEPC)	1st TIER – All offset treatment plots across a VZ show an increase in PEPC	Review factors leading to increase in perennial weed cover. Identify the location of weed infestations and review additional management (i.e. the need for control measures such as broad-acre spraying, spot-spraying, slashing, hand-removal or controlled burns).

Aspect	Trigger	Action/Response
	2nd TIER – Offset treatment plots record PEPC above 20%	Review factors leading to high perennial weed cover. Identify the location of weed infestations and review additional management (i.e. the need for control measures such as broad-acre spraying, spot-spraying, slashing, hand-removal or controlled burns).

5.17.2 Risk Assessment

Following preparation of the *TCM Threatened Fauna Implementation Plan* (Whitehaven, 2015a) and *TCM Box-Gum Woodland Endangered Ecological Community Implementation Plan* (Whitehaven, 2015b), a risk assessment was undertaken to confirm that appropriate measures are included in the OMP to manage risks (impediments) to achieving the objectives of the offset area. The risk assessment is provided in **APPENDIX D:**.

6 REPORTING AND REVIEW

In accordance with the various NSW Project/State Significant Development Approvals and EPBC Approvals, this OMP will be effective for the period of effect of each relevant approval. The OMP may be revised from time to time in accordance with those approvals; however once approved, the WHC OMP will be published on each of relevant WHC Mine webpages within one month.

A summary of WHC OMP reporting requirements is provided in **Table 6.1**: .

Table 6-1: Biodiversity Management Reporting frequencies

Aspect	Section	Frequency/Timing
Seed Management	5.4	Annual
Revegetation	5.5	Annual
Ecological Thinning	5.6	Annual
Habitat Augmentation	5.7	Annual
Heritage Management	5.8	Annual
Weed Management	5.9	Annual
Pest Animal Management	5.10	Annual
Soil Management	5.11	Annual
Agriculture Management	5.12	Annual
Bushfire Management	5.13	Annual
Flora Monitoring	5.14	Annual
Fauna Monitoring	5.15	Annual/Biennial
Performance and Completion Criteria	5.16	Annual
Risks and Contingency Measures	5.17	As required

6.1 REPORTING SURVEY DATA

WHC will ensure that survey data will be recorded so as to conform to data standards notified from time to time by CDCCEEW in accordance with EPBC Approval conditions. If requested by the CDCCEEW, WHC will provide all species and ecological survey data and related survey information from ecological surveys undertaken for the relevant Matters of National Environmental Significance. This survey data will be provided within 30 business days of request, or in a timeframe agreed to in writing by CDCCEEW.

WHC will maintain accurate records substantiating all activities and outcomes associated with or relevant to EPBC Approvals, including measures taken to implement the OMP, and make them available upon request to the CDCCEEW.

6.2 REPORTING REQUIREMENTS

The reporting processes outlined in **Table 6.2** will be undertaken on the management and monitoring programs of the BOA.

Table 6-2: Reporting Requirements Specific to the BOA described within each BOS

Reporting Requirement	Reporting Due Date
BCT Conservation Agreement and Biobanking Annual Reporting	31 March
NSW Project/State Significant Development Approval Review Reporting (also for relevant Commonwealth EPBC Approvals)	31 March
Commonwealth EPBC Approval Annual Compliance Reporting	12 June
BTM Complex/Leard Forest Regional Biodiversity Strategy Joint Annual Biodiversity Summary Report	Annual

6.2.1 BCT Conservation Agreement and Biobanking Annual Reporting

To meet the requirements of Conservation Agreement CA0060; WHC is to submit annual reports to the BCT that includes:

- Reporting Template against conditions of the Agreements; and
- Summary of annual Flora Monitoring (including Photo monitoring and Flora Monitoring data).

The Conservation Agreement reports for TCM BOS must be submitted by the end of March annually.

6.2.2 NSW Project Approval Annual Review Reporting

TCM is required by the Project Approval TCM 11_0047 to submit an Annual Review Report by the end of March annually (or an agreed alternate time) also for relevant Commonwealth EPBC Approvals. Each Annual Review Report outlines the environmental performance of the relevant WHC Mine over the previous calendar year including a detailed summary of the BOS and a summary of biodiversity management implemented during that period including:

- the progress of management activities undertaken in the offset areas;
- the outcome of those management activities;
- any need for improved management; and
- activities to undertake such improved management.

6.2.3 Commonwealth EPBC Approval Annual Compliance Reporting

A report pertaining to the annual compliance will be published on the relevant WHC Mine webpages each year (after the anniversary date of commencement for each respective Mine) in accordance the EPBC Approval and the end of reporting period and submission deadlines. The end of reporting for TCM 2011/5923 is 12 March and submission deadline is 12 June.

Non-compliance with any of the conditions will be reported to CDCCEEW at the same time as the compliance report is published.

Both the BCT and Annual Review Reporting will be the processes by which WHC report to CDCCEEW the progress of management activities undertaken in the BOA and the outcome of those activities, including identifying any need for improved management and activities to undertake such improvement in accordance with relevant conditions of the respective EPBC Approvals.

6.2.4 Boggabri Tarrawonga Maules] Complex/Leard Forest Regional Biodiversity Strategy Joint Annual Biodiversity Summary Report

This reporting process is only applicable to TCM as it a part of the BTM (Boggabri Tarrawonga Maules Creek) Mining Complex within the Leard Forest and therefore is subject to the Regional Biodiversity Strategy (RBS). The RBS provides a strategic framework for the management and implementation of the BTM Complex biodiversity offset programs and to provide guidance for co-ordinated management with other land managers within the region (Umwelt, 2017). To achieve coordinated and successful biodiversity management within the region, the RBS specifies that the BTM Complex must prepare an 'Annual Summary Report' detailing the overall biodiversity performance and outcomes of biodiversity offsets (Table 2.2 Point 6.1 of the RBS). The purpose of Joint Annual Biodiversity Summary Report is to detail the performance and outcomes of the BTM Complex biodiversity offsets as stipulated in the RBS.

6.3 REVIEW AND REVISION OF THE OFFSET MANAGEMENT PLAN

This OMP will be effective for the period of approval and will be reviewed and revised from time to time in accordance with the relevant NSW and Commonwealth Approvals. An overview of the Commonwealth and NSW revision requirements are provided below.

Commonwealth Requirements

In accordance with the EPBC Approval 2011/5923, if WHC wishes to carry out any activity otherwise than in accordance with this OMP then WHC will submit a revised OMP to CDCCEEW for the Minister's written approval. The varied activity shall not commence until the Minister has approved the revised plan in writing. The Minister will not approve a revised plan unless the revised plan would result in an equivalent or improved environmental outcome, therefore, should WHC submit a revised OMP for EPBC Act approval WHC will specify in its submission to the Commonwealth how the revised approved OMP meets this requirement.

NSW Requirements

In accordance with the Project Development Approvals MP 11_0047, the OMP will be reviewed, and revised if necessary to the satisfaction of the NSW Secretary of DPHI (foremly DPE), within three months of:

- the submission of an annual review;
- the submission of an incident report;
- the submission of an audit report; or
- any modification to the conditions of the consent (unless the conditions require otherwise).

Further, WHC must comply with reasonable requirements of the Secretary of DPHI (formerly DPE) in respect of their assessment of this OMP or the implementation of actions or measures under this OMP, including any reasonable request to amend this OMP.

6.4 BIODIVERSITY AUDIT

6.4.1 Commonwealth Audit

In accordance the EPBC Approvals 2011/5923, upon the direction of the Commonwealth Minister, WHC will ensure that an independent audit of compliance with the conditions of approval is conducted and a report submitted to the Commonwealth Minister. The independent auditor will be approved by the Commonwealth Minister prior to the commencement of the audit. Audit criteria will be agreed to by the Commonwealth Minister and the audit report will address the criteria to the satisfaction of the Commonwealth Minister.

6.4.2 NSW Audits

Independent Environmental Audit

In accordance with the Project Development Approvals MP 11_0047, an independent audit will be undertaken every 3 years, unless the Secretary directs otherwise. This Environmental Audit will be conducted by a suitably qualified, experienced and independent team of experts whose appointment was endorsed by the NSW Secretary of DPE. The Independent Environmental Audit will assess the environmental performance of the relevant WHC Mine and its compliance to the conditions of the respective Project/State Significant Development Approvals including the relevant Biodiversity conditions and this OMP.

Biodiversity Audit

Further to the Independent Environmental Audit process above; TCM in accordance with Condition 50 of Schedule 3 to PA 11_0047, every three years WHC will commission suitably qualified, experienced and independent person/s, whose appointment was approved by the NSW Secretary of DPE, to undertake an audit of the revegetation of the rehabilitation area, management and restoration within the Biodiversity Offset Strategy areas. Most recent Biodiversity Audit was completed in 2020, therefore the next scheduled Biodiversity Audit for TCM will be before the end of June 2023 (or as otherwise agreed).

6.5 BIODIVERSITY TRAINING

Inductions for staff and contractors to the BOA will be conducted to make them aware of the environmental issues relevant to WHC. Further targeted training (i.e. fire management) is to be undertaken appropriate to their role and responsibilities. Additional training relevant to this OMP will be undertaken for the Tarrawonga BOA for the management of impacts to biodiversity and records will be retained by WHC.

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APPENDIX A: TARRAWONGA COAL MINE RELEVANT STATE APPROVAL CONDITIONS

Project Approval 11_0047 Requirements

<table>
<tr><th>Condition Number</th><th>Condition</th><th>Relevant OMP Section</th></tr>
<tr><td colspan="3">SCHEDULE 3: ENVIRONMENTAL PERFORMANCE CONDITIONS</td></tr>
<tr><td colspan="3">Biodiversity Offset Strategy</td></tr>
<tr><td>40</td><td>The Proponent shall implement the biodiversity offset strategy described in the EA, summarised in Table 13 and shown conceptually in Appendix 7, to the satisfaction of the Secretary.

Table 9: Summary of the biodiversity offset strategy
<table><tr><th>Area</th><th>Offset Type</th><th>Minimum Size (hectares)</th></tr><tr><td>Willeroi Offset Area</td><td>Existing native vegetation to be enhanced, and additional native vegetation to be established with the restoration of at least 193 ha of Box-Gum Woodland EEC*, as listed under the BC Act</td><td>1,660</td></tr><tr><td>Rehabilitation Area</td><td>Native woodland vegetation communities to be re-established, focused on Box-Gum Woodland EEC*</td><td>752</td></tr></table>Note: For the purposes of this approval Box-Gum Woodland refers to the EEC* listed as White Box Yellow Box Blakely's Red Gum Woodland under the BC Act, and the CEEC listed as White Box Yellow Box Blakely's Red Gum Grassy Woodland and Derived Native Grasslands under the EPBC Act, or similar EEC as may be updated from time to time.

*now CEEC under the BC Act</td><td>4.1</td></tr>
<tr><td>40A</td><td>In addition to the biodiversity offset requirements in Table 13, by the end of 2021, unless otherwise agreed by the Secretary, the Proponent must retire biodiversity credits of a number and class specified in Table 13A below, to offset the further biodiversity impacts of the project.

The retirement of these credits must be carried out in accordance with the NSW Biodiversity Offsets Policy for Major Projects and can be achieved by acquiring or retiring biodiversity credits within the meaning of the BC Act.

Table 13A: Additional biodiversity credit requirements
<table><tr><th>PCT Number</th><th>PCT Name</th><th>Credits Required</th></tr><tr><td colspan="3">Ecosystem Credits</td></tr><tr><td>PCT 847</td><td>Grey Box – Blakely's Red Gum – Yellow Box grassy open forest of the Nandewar Bioregion and New England Tableland Bioregion</td><td>2</td></tr><tr><td>PCT 101</td><td>Poplar Box – Yellow Box – Western Grey Box grassy woodland on cracking clay soils mainly in the Liverpool Plains, Brigalow Belt South Bioregion</td><td>3</td></tr><tr><td colspan="3">Species Credits</td></tr><tr><td>-</td><td>Slender Darling Pea (Swainsona murrayana)</td><td>4</td></tr></table></td><td></td></tr>
</table>

Threatened Species		
43	*For the White Box – Yellow Box – Blakely's Red Gum Grassy Woodland Endangered Ecological Community the Proponent shall:* *(c) ensure that the Biodiversity Offset Strategy and site Rehabilitation Strategy is focused on protection rehabilitation, re-establishment and long-term maintenance of viable stands of this community;* *(d) investigate in consultation with BCS and the LLS, all factors likely to enhance or impede the effective long term restoration of degraded remnants of this EEC in offset areas or regeneration of this EEC on disturbed areas (both offset areas and the site);* *(e) within 24 months of the date of this approval (and if possible in conjunction with Stage 2 of the Leard Forest Mining Precinct Regional Biodiversity Strategy), submit a report of this investigation and provide an implementation plan to maximise the prospects for rehabilitation and regeneration of this EEC on the offset areas and the site, for approval by the Secretary; and* *(f) incorporate the approved implementation plan into the revised Biodiversity Management Plan, required under condition 48.*	1.6 / APPENDIX B:, 2.1 and 4.1
44	*For all threatened species on site, the Proponent shall ensure that the Biodiversity Offset Strategy and Rehabilitation Strategy are focused on protection, rehabilitation and long-term maintenance of viable stands of suitable habitat for these species.*	1.6, 4.1 and APPENDIX B:
45	*The Proponent shall:* *(a) investigate, in consultation with BCS and the LLS, all factors likely to enhance or impede the effective long term provision of suitable habitat(s) for the following species: Speckled Warbler, Brown Treecreeper, Grey-crowned Babbler, Hooded Robin, Varied Sittella, Turquoise Parrot, Masked Owl, Yellow-bellied Sheath Tail Bat and Squirrel Glider;* *(b) within 12 months of the date of this approval (and if possible, in conjunction with Stage 2 of the Leard Forest Mining Precinct Regional Biodiversity Strategy), submit a report of this investigation and provide an implementation plan to ensure delivery of suitable areas of viable habitat for the species included in (a) above, for approval by the Secretary; and* *(c) incorporate the approved implementation plan into the revised Biodiversity Management Plan, required under condition 48.*	1.6, 2.1 and APPENDIX B:
Long Term Security of Offset		
46	*The Proponent shall make suitable arrangements to provide appropriate long-term security for the offset areas:* *(a) for the Willeroi Offset Area the long-term security shall be provided by way of:* • *the Proponent entering into a conservation agreement or agreements pursuant to section 69B of the* National Parks and Wildlife Act 1974*, recording the obligations assumed by the Proponent under the conditions of this approval in relation to these offset areas, and registering the agreement(s) pursuant to section 69F of the* National Parks and Wildlife Act 1974*; or* • *a tenure of higher conservation status such as a National Park, or Nature Reserve, under the* National Parks and Wildlife Act 1974*,* *The conservation agreement(s) must be registered by the end of December 2013 unless agreed otherwise by the Secretary after consultation with BCS. The conservation agreements must remain in force in perpetuity; and* *(b) by the end of December 2030 unless otherwise agreed by the Secretary, for the woodland to be established in the Rehabilitation Area, as identified in Table 14, to the satisfaction of the Secretary.*	4.2

	Note: The Department acknowledges that the Proponent is investigating the potential to transfer part or all of the Willeroi Offset Area directly to the national park estate, and accepts that interim conservation measures may be implemented prior to this transfer.	
Biodiversity Management Plan		
47	*The Proponent shall prepare and implement a Biodiversity Management Plan for the project to the satisfaction of the Secretary. This plan must:* *(a) be prepared in consultation with BCS, DAWE, Forests NSW, the CCC, DPIE Water Catchments and Lands and the LLS, and be submitted to the Secretary for approval by the end of May 2013;*	1.2 and 1.4
	(b) describe the short, medium, and long term measures that would be implemented to: • *manage the remnant vegetation and habitat on the site and in the offset area; and*	5
	• *implement the biodiversity offset strategy, including detailed performance and completion criteria;*	5
	(c) include detailed performance and completion criteria for evaluating the performance of the biodiversity offset strategy, and triggering remedial action (if necessary);	5.16
	(d) include a detailed description of the measures that would be implemented for:	
	• *enhancing the quality of existing vegetation and fauna habitat;*	5.5 and 5.7
	• *restoring native vegetation and fauna habitat on the biodiversity offset area and rehabilitation area through focusing on assisted natural regeneration, targeted vegetation establishment and the introduction of naturally scarce fauna habitat features;*	5.5 and 5.7
	• *maximising the salvage of resources within the approved disturbance area – including vegetative, top and sub soils and cultural heritage resources – for beneficial reuse in the enhancement of the biodiversity offset area or rehabilitation area;*	Mine Site BMP
	• *collecting and propagating seed;*	5.4
	• *minimising the impacts on fauna on site, including undertaking pre-clearance surveys;*	Mine Site BMP
	• *managing any potential conflicts between the proposed restoration works in the biodiversity offset area and any Aboriginal heritage values (both cultural and archaeological);*	5.8
	• *managing salinity;*	Mine Site BMP
	• *controlling weeds and feral pests;*	5.9 and 5.10
	• *controlling erosion;*	5.11
	• *controlling access; and*	5.3.1
	• *managing bushfire risk;*	5.13
	(e) include a seasonally-based program to monitor and report on the effectiveness of these measures, and progress against the detailed performance and completion criteria;	5.14 and 5.15
	(f) identify the potential risks to the successful implementation of the biodiversity offset strategy, and include a description of the contingency measures that would be implemented to mitigate against these risks; and	5.17
	(g) include details of who would be responsible for monitoring, reviewing, and implementing the plan. *Note: The Biodiversity Management Plan and Rehabilitation Management Plan need to be substantially integrated for achieving biodiversity objectives for the rehabilitated mine-site.*	1.5

Conservation Bond		
49	*By the end of May 2013, the Proponent shall lodge a Conservation and Biodiversity Bond with the Department to ensure that the biodiversity offset strategy is implemented in accordance with the performance and completion criteria of the Biodiversity Management Plan. The sum of the bond shall be determined by:* *(a) calculating the full cost of implementing the biodiversity offset strategy (other than land acquisition costs); and* *(b) employing a suitably qualified quantity surveyor to verify the calculated costs,* *to the satisfaction of the Secretary.* *If the offset strategy is completed generally in accordance with the completion criteria in the Biodiversity Management Plan to the satisfaction of the Secretary, the Secretary will release the bond.* *If the offset strategy is not completed generally in accordance with the completion criteria in the Biodiversity Management Plan, the Secretary will call in all, or part of, the conservation bond, and arrange for the satisfactory completion of the relevant works.* *With the agreement of the Secretary, this bond may be combined with rehabilitation security deposit administered by MEG.* *Notes:* • *Alternative funding arrangements for long term management of the Biodiversity Offset Strategy, such as provision of capital and management funding as agreed by BCS as part of a Biobanking Agreement or transfer to conservation reserve estate can be used to reduce the liability of the conservation and biodiversity bond.* • *The sum of the bond may be reviewed in conjunction with any revision to the biodiversity offset strategy.*	5.3.5

APPENDIX B: LEARD FOREST REGIONAL BIODIVERSITY STRATEGY STAGE 2 – STRATEGY REPORT (UMWELT, 2017) REQUIREMENTS

Leard Forest Regional Biodiversity Strategy Stage 2 – Strategy Report (Umwelt, 2017) Requirements

Table Number	Section Number	Requirement	Relevant OMP Section
Strategic Focus Area 1 – Enhance the quality of habitats and landscapes at the OFFSET sites for White Box – Yellow Box – Blakely's Red Gum Woodland EEC* and CEEC			
2.1	1.1	*Natural regeneration is promoted through management of threatening processes including:* • *the management of weeds (refer to Strategic Focus Area 3);* • *the management of pest animals (refer to Strategic Focus Area 3) and* • *livestock restriction (where appropriate, in conjunction with strategic grazing).*	5.9, 5.10 and 5.12
2.1	1.1	*Natural regeneration management options (such as thinning, slashing, controlled burning) can be undertaken to promote canopy species regeneration in dense grasslands and cypress pine regrowth areas.* *Methods and results of this should be communicated and made available for future similar regeneration efforts in the region.*	5.6 and 5.13
2.1	1.2	*Seed collection, management and storage should be undertaken in consideration of the Florabank Guidelines (www.florabank.org.au/).*	5.4
2.1	1.3	*When restoring areas of White Box – Yellow Box – Blakely's Red Gum Woodland EEC* and CEEC, active revegetation should be undertaken generally in accordance with A Guide to Managing Box Gum Grassy Woodlands (Rawlings et al. 2010).*	5.5
2.1	1.3	*Direct seeding and/or tubestock planting should be undertaken in areas where natural regeneration is unlikely to occur (such as low-diversity derived native grassland, pasture and cultivated land) and where natural regeneration areas require supplementary actions (as per TARPs in Table 2.4).*	5.5
2.1	1.3	*Seed and tubestock used in revegetation should include a variety of grasses, low shrubs, mid-sized shrubs and trees, characteristic of White Box – Yellow Box – Blakely's Red Gum Woodland EEC* and CEEC (as per the NSW Final Determination and Commonwealth Listing Advice for the communities), to create structurally diverse habitat.*	5.5
2.2	1.1	*Monitoring of regenerating White Box – Yellow Box – Blakely's Red Gum Woodland EEC* and CEEC should be undertaken annually and across Offset sites. It is recommended that the season for the monitoring sites is rotated every year to assess the community during different seasons. For example:* • *half of the monitoring sites surveyed in autumn (to maximise the detection of native perennials); and* • *half of the monitoring sites surveyed in spring (to identify the extent of exotic annuals in the community).*	5.14
2.2	1.1	*Monitoring should be undertaken in accordance with BioBanking Assessment Methodology (BBAM) (2014) or Biodiversity Assessment Method (BAM), whichever is determined to be the most appropriate through consultation with OEH, to analyse trends against benchmark data by:* • *undertaking plot and transect surveys;* • *undertaking at least the minimum number of plots and transects per vegetation zone; and* • *photographic monitoring at permanent monitoring points conducted using a consistent methodology across the Offset sites.*	5.14
2.2	1.1	*During monitoring surveys, specific notes should be taken on any dense or emerging stands of exotic plant species, such as Coolatai grass (Hyparrhenia hirta) and invasive native species such as white cypress pine (Callitris glaucophylla) or black cypress pine (Callitris endlicheri), that may result in the suppression of native understorey species establishment.*	5.14
2.2	1.1	*Monitoring should be undertaken within the Offset sites at least annually for the first five years and then every two years until preliminary completion criteria (refer to Table 2.3) are met.*	5.14

Table Number	Section Number	Requirement	Relevant OMP Section
2.2	1.1	*For the BTM Complex, monitoring results should be outlined in a consistent summary report template to allow for the comparison of results and a consistent understanding of the condition of naturally regenerating White Box – Yellow Box – Blakely's Red Gum Woodland EEC* and CEEC broadly across the Offset sites.*	6.2.4
2.2	1.2	*The completion of an Annual Summary Report should be undertaken following each collection event. This should include records of species, qualities, dates and locations as per the Florabank Guideline 4 (www.florabank.org.au/).*	5.4
2.2	1.3	*Monitoring of revegetated White Box – Yellow Box – Blakely's Red Gum Woodland EEC* and CEEC should be undertaken annually and across the BTM Complex Offset sites. It is recommended that the season for the monitoring sites is rotated every year to assess the community during different seasons. For example:* • *half of the monitoring sites surveyed in autumn (to maximise the detection of native perennials); and* • *half of the monitoring sites surveyed in spring (to identify the extent of exotic annuals in the community).*	5.14
2.2	1.3	*Monitoring should be undertaken in accordance with BioBanking Assessment Methodology (BBAM) (2014) or Biodiversity Assessment Method (BAM) (in prep.), whichever is determined to be the most appropriate through consultation with OEH, to analyse trends against benchmark data by:* • *undertaking plot and transect surveys;* • *undertaking at least the minimum number of plots and transects per vegetation zone; and* • *photographic monitoring at permanent monitoring points conducted using a consistent methodology across the Offset sites.*	5.14
2.2	1.3	*During monitoring surveys, specific notes should be taken on any dense or emerging stands of exotic plant species, such as Coolatai grass (Hyparrhenia hirta) and invasive native species such as white cypress pine (Callitris glaucophylla) or black cypress pine (Callitris endlicheri), that may result in the suppression of native understorey species establishment.*	5.14
2.2	1.3	*Monitoring should be undertaken within the Offset sites at least annually for the first five years and then every two years until preliminary completion criteria (refer to Table 2.3) are met.*	5.14
2.2	1.3	*For the BTM Complex, monitoring results should be outlined in a consistent summary report template to allow for the comparison of results and a consistent understanding of the condition of actively revegetated White Box – Yellow Box – Blakely's Red Gum Woodland EEC* and CEEC broadly across the Offset sites.*	6.2.4
Strategic Focus Area 2 – Provide ongoing management and enhancement of existing habitats at the offset sites for threatened species			
2.1	2.1	*Salvage of habitat resources should be undertaken within the approved disturbance area for re-use in the areas surrounding the disturbance areas, rehabilitation areas and the offset sites. This will include the salvage of one or more of the following habitat features where they are available and of suitable structural integrity:* • *fallen timber;* • *arboreal hollows;* • *hollow logs; and* • *bush rock.*	5.7
2.2	2.1	*Salvaged arboreal hollows located within areas surrounding the disturbance areas, rehabilitation areas and the Offset sites should be monitored for their use and condition in conjunction with other annual fauna monitoring.*	5.7
2.2	2.1	*Monitoring techniques may include the use of remote camera surveys targeting areas where salvaged hollows and fallen timber is installed into habitat. Detailed monitoring techniques are to be outlined in the relevant management plans.*	5.15

Table Number	Section Number	Requirement	Relevant OMP Section
2.1	2.2	*Habitat augmentation, using salvaged resources or nest boxes, should be undertaken in habitats identified as having low habitat resources.*	5.7
2.1	2.2	*Where nest boxes are to be installed:* • *they are to be made from high quality and durable materials that, ideally, provide for a long lifespan.* • *designs should be targeted to the hollow-dependent threatened species known to occur in the locality of the offset site such as woodland birds, arboreal mammals and micro-bats.*	5.7
2.1	2.2	*The total number of hollows (existing hollows and nest boxes combined) at the offset sites should be at least the same as the number of hollows with signs of use (nesting material, feathers, fur, scratches, etc) and of suitable dimensions for species occupancy (suitable entrance size and a hollow chamber extending into the branch/trunk) removed from the impact site.*	5.7
2.1	2.2	*It is expected that the installation of nest boxes would be staged over time to mirror the regeneration of the woodland and the species that are utilising each site.*	5.7
2.1	2.3	*Where Offset sites share common boundaries, fencing should not be restrictive to fauna movement or connectivity between habitats. The need for fencing between contiguous Offset sites that are managed in the same way should be investigated and wherever possible removed/avoided.*	5.3.1
2.1	2.3	*Alternatives to barbed-wire fencing should be used, where appropriate, to avoid obstructing the flight paths of birds, bats and gliders. Any new fencing, where fence lines do not currently exist, should be installed in a way to avoid, or minimise clearing of any native trees or shrubs, where appropriate (Note: clearing/maintenance may still be required in accordance with relevant legislation such as the Native Vegetation Act 2003 or Rural Fires Act 1997).*	5.3.1
2.2	2.1	*Salvaged arboreal hollows located within areas surrounding the disturbance areas, rehabilitation areas and the Offset sites should be monitored for their use and condition in conjunction with other annual fauna monitoring.*	5.7 and 5.15
2.2	2.1	*Monitoring techniques may include the use of remote camera surveys targeting areas where salvaged hollows and fallen timber is installed into habitat. Detailed monitoring techniques are to be outlined in the relevant management plans.*	5.15
2.2	2.2	*An assessment of the number of nest boxes required should be undertaken (the total number of hollows (existing hollows and nest boxes combined) at the Offset sites should be at least the same as the number of hollows with signs of use (nesting material, feathers, fur, scratches, etc) and of suitable dimensions for species occupancy (suitable entrance size and a hollow chamber extending into the branch/trunk) removed from the impact site).*	5.7 and 5.15
2.2	2.2	*Nest boxes installed within the Offset sites should be monitored for their signs of use and condition at consistent times of the year (preferably spring) across the Offset sites targeting species type based on nest box design.*	5.7
2.2	2.2	*Signs of use monitoring may be undertaken using a pole camera that allows viewing of the inhabitants of the boxes as well as a view of the condition of the top of the boxes from the ground with minimal disturbance to the fauna occupying the boxes. Detailed monitoring techniques are to be outlined in the relevant management plans.*	5.15
2.2	2.2	*Monitoring results of next box usage should be reported in the relevant Annual Summary Report.*	6.2.4
2.2	2.3	*Ongoing monitoring and site inspections should note any damage or disrepair of fences to be communicated to the Environmental Representative of the relevant mine site.*	5.3.1
2.2	2.3	*If, during the course of monitoring, the use of barbed-wire fencing is found to be restrictive or damaging to local wildlife (e.g., gliders/bats caught in fencing), this is to be*	5.3.1

Table Number	Section Number	Requirement	Relevant OMP Section
		communicated to the Environmental Representative of the relevant site and ecologically-friendly alternatives are to be investigated.	
Strategic Focus Area 3 – Promote a consistent and coordinated approach to weed management and pest animal control			
2.1	3.1	*Weed management and pest control conditions and trends are to be communicated across the BTM Complex and should include: review monitoring reports for up-to-date information on weeds and pests discussing and prioritising weed and pest animal prevention, control methods and target species across the BTM Complex for the following year; and liaise with local land managers and stakeholders on control measures and schedules.*	5.9, 5.10 and 6.2.4
2.1	3.1	*Develop a feedback loop to alert the BTM Complex of any new or emerging weeds or pest animal species recorded to be occurring on any of the OFFSET sites.*	5.9 and 5.10
2.1	3.1	*Public communication on pest animal records may be reported through FeralScan (www.feralscan.org.au).*	Not Required
2.2	3.1	*Key messages on weed control and pest prevention should be available to employees via toolbox talks and inductions to raise awareness of biodiversity issues in the region (e.g. weed spread prevention through the washing of vehicles and equipment).*	5.9 and 5.10
2.1	3.2	*Weed control should be undertaken in consideration of the control recommendations outlined in: NSW Weeds Control Handbook (8th Edition) (DPI 2018); Narrabri Shire Council Weed Management Plans (http://www.narrabri.nsw.gov.au/weeds-management-plans-1115.html); resources on the NSW WeedWise website (http://weeds.dpi.nsw.gov.au/).*	5.9
2.1	3.2	*Adopt best-practice active and adaptive management of the density of invasive native plants such as white cypress pine (Callitris glaucophylla) and black cypress pine (Callitris endlicheri) such as ecological thinning, targeted grazing and prescribed fire as per the recommendations set out in Actively Managing for Better Ecological Outcomes for the Brigalow and Nandewar State Conservation Areas (NRC 2014).*	5.6
2.1	3.2	*Adopt best-practice management of Coolatai grass (Hyparrhenia hirta) which threatens to suppress the native understorey of Box-Gum Woodlands as per the recommendations set out in the Department of Primary Industries NSW WeedWise Website – http://weeds.dpi.nsw.gov.au/Weeds/Details/179*	5.9
2.1	3.2	*Undertake a coordinated approach to weed monitoring across the Offset sites for consistent reporting and data analysis.*	5.9
2.2	3.2	*Weed occurrences in the Offset sites will be identified as part of the annual flora surveys, but also opportunistically recorded during any other Offset site inspections to examine the effectiveness of control measures.*	5.9 and 5.14
2.2	3.2	*For major weed infestations or newly recorded species, the location, size, density and species should be recorded and communicated to Environmental Representative of the relevant site.*	5.9
2.2	3.2	*During monitoring surveys, specific notes should be taken on any dense or emerging stands of exotic plant species, such as Coolatai grass (Hyparrhenia hirta) and invasive native species such as white cypress pine (Callitris glaucophylla) or black cypress pine (Callitris endlicheri), that may result in the suppression of native species establishment, within White Box – Yellow Box – Blakely's Red Gum Woodland EEC* and CEEC.*	5.14
2.2	3.2	*For the BTM Complex, monitoring results should be outlined in a consistent summary report template to allow for the comparison of results and a consistent understanding of the key weed issues in a broad regional context.*	6.2.4
2.1	3.3	*Pest animal control should be undertaken in consideration of the control recommendations outlined in the Department of Primary Industries Vertebrate Pest Control Manual (DPI 2014).*	5.10

Table Number	Section Number	Requirement	Relevant OMP Section
2.1	3.3	*Control strategies may include the destruction of burrows, shooting, trapping and baiting and should be undertaken following the NSW Codes of Practices (COPs) and Standard Operating Procedures (SOPs) (http://www.dpi.nsw.gov.au/agriculture/pests-weeds/vertebrate-pests/publications/model-codes-of-practice)*	5.10
2.1	3.3	*A coordinated approach to pest animal monitoring should be undertaken across the Offset sites for consistent reporting and data analysis.*	5.10
2.2	3.3	*Observations of pest animals should be undertaken as part of the annual fauna monitoring, but also opportunistically recorded during any other Offset site inspections.*	5.10 and 5.15
2.2	3.3	*Monitoring of pest animals should be undertaken prior to and following the application of control measures to examine the effectiveness of these measures.*	5.10 and 5.15
2.2	3.3	*Monitoring for pest animals should consider the recommendations in the Department of Primary Industries Monitoring Techniques for Vertebrate Pests (http://www.dpi.nsw.gov.au/agriculture/pests-weeds/vertebrate-pests/publications/monitoring-techniques).*	5.10 and 5.15
2.2	3.3	*For significant pest animal occurrences or observed pest animal damage, the date, location, activity, density and pest animal species should be recorded and communicated to the Environmental Representative of the relevant site.*	5.10 and 5.15
2.2	3.3	*For the BTM Complex, monitoring results should be outlined in a consistent summary report template to allow for the comparison of results and a consistent understanding of the key pest animal issues in a broad regional context.*	6.2.4
Strategic Focus Area 4 – Promote a consistent and coordinated approach to fire management for biodiversity			
2.1	4.1	*The accessibility of fire trails and access tracks should be regularly maintained within the Offset sites in accordance with relevant legislation such as the Native Vegetation Act 2003 or Rural Fires Act 1997.*	5.13
2.1	4.1	*A fuel load assessment and an assessment of the feasibility of completing fuel load reduction should be undertaken as identified on a risk basis or as recommended by the Rural Fire Service (RFS).*	5.13
2.1	4.1	*Fuel reduction in the form of strategic grazing should be trialled in appropriate management zones within the Offset sites. The timing of any fuel reduction strategies should be determined based on fuel loads, vegetation maturity and weather/seasonal conditions; however, it should generally be undertaken in autumn to encourage native species recruitment.*	5.13
2.1	4.2	*Control burns should consider the recommendations outlined in Section 9 of A Guide to Managing Box Gum Grassy Woodlands (Rawlings et al. 2010).*	5.13
2.1	4.2	*Control burns should avoid burning trees containing hollow resources, where possible, to minimise impacts on roosting and nesting availability in the landscape.*	5.13
2.1	4.2	*If controlled burning is undertaken, implement mosaic burning to reduce the extent of any negative outcomes, provide refuge for wildlife and promote structural and species diversity.*	5.13
2.2	4.1	*Monitoring of fuel levels will take place as part of the overall annual inspection of the Offset sites but also as identified on a risk basis or as recommended by the RFS.*	5.13
2.2	4.1	*The accessibility and functionality of fire trails and access tracks should be regularly monitored within the Offset sites.*	5.13
2.2	4.2	*If fuel reduction is undertaken in the form of controlled burning, additional flora monitoring points will be required to assess the impacts of control measures on native vegetation communities (particularly within White Box – Yellow Box – Blakely's Red Gum Woodland EEC* and CEEC).*	5.13 and 5.14

Table Number	Section Number	Requirement	Relevant OMP Section
2.2	4.2	*In habitat restoration areas and regeneration/revegetation zones, monitoring will be required to record the response to a fire event and guide the need for potential active and adaptive management.*	5.13 and 5.14
Strategic Focus Area 5 – Enhance the connectivity of habitats through corridor establishment and management			
2.1	5.1	*Offset sites and conservation areas should be managed to improve habitat connectivity and corridor function using management actions techniques such as:* • *targeted revegetation including supplementary tubestock planting and seeding* • *targeted weed and pest management and* • *habitat augmentation with nest boxes and salvaged habitat resources.*	5.5
2.1	5.1	*Enhancement efforts should be focused to improve habitat connectivity within and between existing Offset areas in the region. These broad areas of BTM complex managed land include:* • *land south of Mount Kaputar National Park linking Offset areas east of Leard State Forest,* • *land south of Leard State Forest linking areas to Boonalla Aboriginal Area and Vickery State Forest,* • *land west and northwest of Leard State Forest linking to Pilliga East.*	5.5
2.2	5.1	*Monitoring undertaken as part of other ecological monitoring at the Offset sites should consider the connected landscapes and corridors in the locality and region by including survey techniques to demonstrate fauna movement across these areas such as:* • *remote camera surveys; and* • *radio tracking and/or woodland bird banding;*	5.15

*now CEEC under the BC Act

APPENDIX C: KEY BIOMETRIC ANNUAL PERFORMANCE CRITERIA FOR RELEVANT KEITH CLASSES

Table C-2: Annual performance criteria values for VZs of North-west Slopes Dry Sclerophyll Woodlands (PCTs 563, 588, 589, 594, 1308).

Biometric	Threshold – BVT benchmark	Annual performance criteria (Year since offset established/revegetated)																			
		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
NPS	Lower-80% BVT	1.0	2.1	3.1	4.2	5.2	6.2	7.3	8.3	9.4	10.4	11.4	12.5	13.5	14.6	15.6	16.6	17.7	18.7	19.8	20.8
	Upper-100% BVT	1.3	2.6	3.9	5.2	6.5	7.8	9.1	10.4	11.7	13.0	14.3	15.6	16.9	18.2	19.5	20.8	22.1	23.4	24.7	26
NOS	Lower – Min. BVT	0.3	0.6	0.9	1.2	1.5	1.8	2.1	2.4	2.7	3.0	3.3	3.6	3.9	4.2	4.5	4.8	5.1	5.4	5.7	6
	Upper – Max. BVT	1.3	2.5	3.8	5.0	6.3	7.5	8.8	10.0	11.3	12.5	13.8	15.0	16.3	17.5	18.8	20.0	21.3	22.5	23.8	25
NMS	Lower – Min. BVT	0.3	0.6	0.9	1.2	1.5	1.8	2.1	2.4	2.7	3.0	3.3	3.6	3.9	4.2	4.5	4.8	5.1	5.4	5.7	6
	Upper – Max. BVT	1.3	2.5	3.8	5.0	6.3	7.5	8.8	10.0	11.3	12.5	13.8	15.0	16.3	17.5	18.8	20.0	21.3	22.5	23.8	25
NGCG	Lower – Min. BVT	1.0	2.0	3.0	4.0	5.0	6.0	7.0	8.0	9.0	10.0	11.0	12.0	13.0	14.0	15.0	16.0	17.0	18.0	19.0	20
	Upper – Max. BVT	1.5	3.0	4.5	6.0	7.5	9.0	10.5	12.0	13.5	15.0	16.5	18.0	19.5	21.0	22.5	24.0	25.5	27.0	28.5	30

Table C-3: Annual performance criteria values for VZs of Western Slopes Grassy Woodlands (PCT 1383)

Biometric	Threshold – BVT benchmark	Annual performance criteria (Year since offset established/revegetated)																			
		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
NPS	Lower-80% BVT	0.9	1.8	2.8	3.7	4.6	5.5	6.4	7.4	8.3	9.2	10.1	11.0	12.0	12.9	13.8	14.7	15.6	16.6	17.5	18.4
	Upper-100% BVT	1.2	2.3	3.5	4.6	5.8	6.9	8.1	9.2	10.4	11.5	12.7	13.8	15.0	16.1	17.3	18.4	19.6	20.7	21.9	23
NOS	Lower – Min. BVT	0.3	0.6	0.9	1.2	1.5	1.8	2.1	2.4	2.7	3.0	3.3	3.6	3.9	4.2	4.5	4.8	5.1	5.4	5.7	6
	Upper – Max. BVT	1.3	2.5	3.8	5.0	6.3	7.5	8.8	10.0	11.3	12.5	13.8	15.0	16.3	17.5	18.8	20.0	21.3	22.5	23.8	25
NMS	Lower – Min. BVT	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Upper – Max. BVT	0.3	0.5	0.8	1.0	1.3	1.5	1.8	2.0	2.3	2.5	2.8	3.0	3.3	3.5	3.8	4.0	4.3	4.5	4.8	5
NGCG	Lower – Min. BVT	1.5	3.0	4.5	6.0	7.5	9.0	10.5	12.0	13.5	15.0	16.5	18.0	19.5	21.0	22.5	24.0	25.5	27.0	28.5	30
	Upper – Max. BVT	2.0	4.0	6.0	8.0	10.0	12.0	14.0	16.0	18.0	20.0	22.0	24.0	26.0	28.0	30.0	32.0	34.0	36.0	38.0	40

Table C-4: Annual performance criteria values for VZs of Western Slopes Dry Sclerophyll Forests (PCTs 592)

Biometric	Threshold – BVT benchmark	Annual performance criteria (Year since offset established/revegetated)																			
		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
NPS	Lower-80% BVT	1.2	2.4	3.6	4.8	6.0	7.2	8.4	9.6	10.8	12.0	13.2	14.4	15.6	16.8	18.0	19.2	20.4	21.6	22.8	24
	Upper-100% BVT	1.5	3.0	4.5	6.0	7.5	9.0	10.5	12.0	13.5	15.0	16.5	18.0	19.5	21.0	22.5	24.0	25.5	27.0	28.5	30
NOS	Lower – Min. BVT	1.3	2.5	3.8	5.0	6.3	7.5	8.8	10.0	11.3	12.5	13.8	15.0	16.3	17.5	18.8	20.0	21.3	22.5	23.8	25
	Upper – Max. BVT	2.0	4.0	6.0	8.0	10.0	12.0	14.0	16.0	18.0	20.0	22.0	24.0	26.0	28.0	30.0	32.0	34.0	36.0	38.0	40
NMS	Lower – Min. BVT	0.3	0.6	0.9	1.2	1.5	1.8	2.1	2.4	2.7	3.0	3.3	3.6	3.9	4.2	4.5	4.8	5.1	5.4	5.7	6
	Upper – Max. BVT	1.3	2.5	3.8	5.0	6.3	7.5	8.8	10.0	11.3	12.5	13.8	15.0	16.3	17.5	18.8	20.0	21.3	22.5	23.8	25
NGCG	Lower – Min. BVT	1.0	2.0	3.0	4.0	5.0	6.0	7.0	8.0	9.0	10.0	11.0	12.0	13.0	14.0	15.0	16.0	17.0	18.0	19.0	20
	Upper – Max. BVT	1.5	3.0	4.5	6.0	7.5	9.0	10.5	12.0	13.5	15.0	16.5	18.0	19.5	21.0	22.5	24.0	25.5	27.0	28.5	30

APPENDIX D: OFFSET RISK ASSESSMENT

The following risk assessment considers impact of risks from management actions in the BOA. The risk model is based on the WHC Risk Matrix. In addition to TCM policy, this risk assessment addresses DPIE Offset Principle 6 to manage 'uncertainties and risks associated with actions such as revegetation'.

Risk is defined as the effect of uncertainty on objectives (Standards Australia 2009). The likelihood of risk occurring and the level of impact of that risk are used to assess each risk and inform management responses (Table D-1**Table D-1**). The higher the risk score, the more urgent the response. A 'critical' classification denotes risks that significantly exceed the risk acceptance threshold. Immediate attention is required to stop the job. 'High' risks exceed the risk acceptance threshold. Additional risk control measures required. If further risk control measures are not practicable the responsible Manager must sign off. A 'moderate' risk meets the acceptance threshold. Additional control measures could be implemented to control risks further, with active monitoring of risk control measures required. 'Low' risks are below the risk acceptance threshold. No additional control measures are required, however, monitoring of risks may be needed.

		CONSEQUENCE				
		Insignificant	Minor	Medium	Major	Catastrophic
		1	2	3	4	5
LIKELIHOOD	Almost Certain A	Moderate	High	High	Critical	Critical
	Likely B	Moderate	Moderate	High	High	Critical
	Occasional C	Low	Moderate	High	High	High
	Unlikely D	Low	Low	Moderate	Moderate	High
	Rare E	Low	Low	Moderate	Moderate	High

Figure D-1: Risk Assessment of Non-Achievement of OMP Objectives

To address the risks identified in **Table D-1** the Manager will:

1. Educate TCM staff, contractors and neighbouring properties of the BOA objectives and location
2. Avoid potential impacts by following the recommended protocol in this BMP for each management action
3. Mitigate potential impacts by regular monitoring and applying corrective action under an adaptive management framework
4. Report incidences and responses in the Annual Report (**Section 6**) to facilitate managerial review and if necessary, trigger systemic change of practice

Table D-1: Risk Assessment

Risk Factor (Hazard)	Impact (Risk)	Before Management			Action/Control/Risk Mitigation Measure	After Management		
		Likelihood	Consequence	Risk		Likelihood	Consequence	Risk Level
Substrate	Poor soil chemistry – depleted soil nutrients	B	4	M	• selective use of slow-release fertiliser to promote plant growth (if required); and • reuse timber/hollow logs salvaged during vegetation clearance.	C	4	L
	Poor soil chemistry – elevated soil nutrients	B	4	M	• nutrient reduction options (e.g., crash grazing periodically to remove nutrients locked in weeds)	C	4	L
	Erosion and sedimentation	B	4	M	• targeted revegetation along drainage lines and scalded areas to minimise risk of erosion; • restriction of livestock access to erosion prone areas (e.g., along watercourses); • locate new offset area management infrastructure (e.g., access roads) in stable locations; and • maximise the re-use of existing infrastructure (e.g., access roads).	C	4	L
	Soil compaction – inhibits germination of seeds or growth of seedlings	B	4	M	• vehicle access will be predominantly restricted to designated tracks; • livestock will be excluded from areas undergoing active revegetation; and • site preparation in cleared land (e.g., ripping or use of spiked rollers) and (where relevant) in derived grassland (e.g. use of spiked rollers).	C	4	L
	Ground disturbance	C	4	L	• vehicle access will be predominantly restricted to designated tracks; • fencing and signage around the perimeter of the offset area; and • low disturbance revegetation techniques in existing Box-Gum Woodland and derived grasslands.	D	4	L
Clearing	Incidental clearing, fragmentation and fire-wood collection	C	4	L	• restriction of clearing; • firewood collection not permitted; • fencing and signage around the perimeter of the offset area; • locate new offset area management infrastructure (e.g., access roads) preferentially in cleared land; and • maximise the re-use of existing infrastructure (e.g. access roads).	D	4	L

Risk Factor (Hazard)	Impact (Risk)	Before Management			Action/Control/Risk Mitigation Measure	After Management		
		Likelihood	Consequence	Risk		Likelihood	Consequence	Risk Level
Livestock	Grazing by cattle – ground disturbance, remove or destroy seeds, seedlings or plantings	C	2	H	• restrict livestock access to erosion prone areas (e.g. along watercourses); • livestock will be excluded from areas undergoing active revegetation; • restrict livestock access to areas not already subject to grazing; • management of livestock to maintain groundcover and diversity of native plants; • restrict livestock access to protect plants that are known to be sensitive to grazing; and • controlled grazing management.	D	3	L
Introduced flora species (weeds)	Weed invasion – perennial and annual grasses, perennial herbs, annual and biennial herbs and woody weeds	C	2	H	• provide application rates for seeds as well as planting densities for tube stock to avoid excessive shading; • weed management; • sowing of Kangaroo Grass; and • lightly graze derived grasslands in times of suitable climatic conditions for weed growth.	D	3	L
Herbicide	Excessive herbicides – may have negative effects on native species	C	4	L	• herbicides minimised through spot-spraying, basal spraying, stem injection or cut and paint application methods.	C	4	L
Impacts from Animals (exotics and grazing native animals)	Grazing by feral pigs and goats	B	3	H	• procedures to prevent, monitor and control feral animals; and • option for using tree guards to protect young seedlings.	B	5	L
	Rabbits and hares	B	3	H	• procedures to prevent, monitor and control feral animals.	B	5	L
	Grazing native fauna species (e.g., kangaroos)	B	4	M	• option for using tree guards to protect young seedlings. • provision to review the need for kangaroo control measures.	B	5	L
	Feral foxes	B	3	H	• procedures to prevent, monitor and control feral animals.	B	5	L
	Deer	C	4	L	• provide monitoring of deer and feral cats and control (if required).	B	5	L
	Feral Cat	B	4	M	• provide monitoring of deer and feral cats and control (if required).	B	5	L
Fire	Uncontrolled bushfire	B	2	H	• maintaining fire breaks and access; • schedule for maintenance of fire breaks and fire trails; • schedule for assessing fuel loads; and • option for using controlled grazing to reduce biomass.	D	3	L

Risk Factor (Hazard)	Impact (Risk)	Before Management			Action/Control/Risk Mitigation Measure	After Management		
		Likelihood	Consequence	Risk		Likelihood	Consequence	Risk Level
Floristics	Poor diversity in the seed mix or tube stock	C	3	M	• procedures for strategic and long term seed collection, management and storage ; • procedures for sowing seed (e.g., appropriate sowing depths); and • favour natural regeneration in the derived grasslands and woodland areas over seeding or planting in the first instance followed by seeding or planting if required.	D	3	L
	Unsuitable species in the seed mix or tube stock	C	3	M	• preferential use of local endemic (adapted) species, or the use of a high quality seed source further from the site over a low quality more local seed source; and • favour natural regeneration in the derived grasslands and woodland areas over seeding or planting in the first instance followed by seeding or planting if required.	D	3	L
	Shortage of sufficient seed or tube stock	C	3	M	• a seed and tube stock supply strategy to meet demand.	D	3	L
	Poor understorey diversity	C	3	M	• application rates for seeds as well as planting densities for tube stock; • preferential use of local endemic (adapted) species, or the use of a high quality seed source further from the site over a low quality more local seed source; • provision to assess vegetation density and undertake ecological thinning (e.g., through selective clearance or fire) if necessary; • measures to improve understorey diversity (e.g., replanting, causing disturbance through fire or grazing); and • wide diversity of species in the seed mix.	D	3	L
	Over-collection of seed for revegetation purposes	C	3	M	• a seed and tube stock supply strategy to meet demand; and • provide for the preferential use of local endemic (adapted) species, or the use of a high quality seed source further from the site over a low quality more local seed source.	D	3	L

Risk Factor (Hazard)	Impact (Risk)	Before Management			Action/Control/Risk Mitigation Measure	After Management		
		Likelihood	Consequence	Risk		Likelihood	Consequence	Risk Level
Native plant growth	Poor native plant growth/germination	C	3	M	• describe procedures for strategic and long term seed collection, management and storage ; • describe procedures for sowing seed (e.g., appropriate sowing depths); • describe how livestock will be excluded from areas undergoing active revegetation; • provide application rates for seeds as well as planting densities for tube stock to avoid excessive shading; • favour natural regeneration in the derived grasslands and woodland areas over seeding or planting in the first instance followed by seeding or planting if required; and • preferential use of local endemic (adapted) species, or the use of a high quality seed source further from the site over a low quality more local seed source.	C	4	L
	Dense overstorey and midstory revegetation	C	3	M	• include provision to assess vegetation density and undertake ecological thinning (e.g., through selective clearance or fire) if necessary.	C	4	L
	Dense grass cover	C	3	M	• provide measures to improve understorey diversity (e.g. replanting, causing disturbance through fire or grazing).	C	4	L
	Disease (e.g., *Phytophthora cinnamomi*)	C	4	L	• include hygiene protocols to minimise the risk of plant diseases (i.e. restricting site access).	C	4	L
	Fungi or pathogens – may cause germination failure (seeds)	C	4	L	• provide for the preferential use of local endemic (adapted) species, or the use of a high quality seed source further from the site over a low quality more local seed source.	C	4	L
Fauna habitat	Lack of suitable vegetation for foraging and/or roosting	C	4	L	• include the planting (in appropriate soil landscapes) of a variety of box, ironbark and gum eucalypt species which are all known to occur in the Leard State Forest or offset area • planting of Acacia species, including both tree and shrub varieties including shrub varieties; • planting of a variety of native shrubs; and • describe that seed and tube stock used in revegetation will include a variety of grasses, low shrubs, mid-sized shrubs and tall trees to create structurally diverse habitat.	C	4	L

Risk Factor (Hazard)	Impact (Risk)	Before Management			Action/Control/Risk Mitigation Measure	After Management		
		Likelihood	Consequence	Risk		Likelihood	Consequence	Risk Level
Weather	Drought	C	3	M	• growth and survival of the vegetation sown or planted will be monitored; • provide a mechanism to reduce livestock grazing during drought periods; • include provision to review the need for kangaroo control measures; and • describe procedures to prevent, monitor and control feral animals.	C	4	L
	Wind	C	4	L	• option for using tree guards to protect young seedlings from browsing or grazing native animals.	C	4	L

APPENDIX E:
WILLEROI WEST FLORA MONITORING PLOTS

Table E-1: Willeroi West Flora Survey Co-ordinates

Plot ID	Old Plot ID	Vegetation Zone	Easting	Northing	Plot Type
FL-NWS-WIL-1-G		NWSDSW_Good	241811	6630287	Treatment
FL-NWS-WIL-2-G		NWSDSW_Good	241733	6629832	Treatment
FL-NWS-WIL-3-G		NWSDSW_Good	242713	6627536	Treatment
FL-NWS-WIL-4-G		NWSDSW_Good	243106	6627091	Treatment
FL-NWS-WIL-5-G		NWSDSW_Good	243275	6626644	Treatment
FL-NWS-WIL-7-S		NWSDSW_Semi_cleared	242275	6629418	Treatment
FL-NWS-WIL-9-S		NWSDSW_Semi_cleared	243024	6627785	Treatment
FL-NWS-WIL-10-S		NWSDSW_Semi_cleared	244107	6627865	Treatment
FL-NWS-WIL-11-S		NWSDSW_Semi_cleared	243710	6626922	Treatment
FL-NWS-WIL-12-S		NWSDSW_Semi_cleared	243482	6625817	Treatment
FL-NWS-WIL-13-S		NWSDSW_Semi_cleared	242682	6625809	Treatment
FL-WSD-WIL-14-G		WSDSF_Good	239943	6629370	Treatment
FL-WSD-WIL-15-G		WSDSF_Good	240595	6629813	Treatment
FL-WSD-WIL-16-G		WSDSF_Good	240961	6629921	Treatment
FL-WSD-WIL-17-G		WSDSF_Good	240962	6629429	Treatment
FL-WSD-WIL-18-G		WSDSF_Good	241359	6629095	Treatment
FL-WSD-WIL-19-G		WSDSF_Good	241045	6628847	Treatment
FL-WSD-WIL-20-G		WSDSF_Good	240492	6628531	Treatment
FL-WSG-WIL-21-D	VS44	WSGW_DNG_Cleared	243062	6628329	Treatment
FL-WSG-WIL-22-D	VS45	WSGW_DNG_Cleared	243217	6628541	Treatment
FL-WSG-WIL-23-D	VS46	WSGW_DNG_Cleared	242990	6628979	Treatment
FL-WSG-WIL-24-D	VS47	WSGW_DNG_Cleared	242829	6629900	Treatment
FL-WSG-WIL-25-D		WSGW_DNG_Cleared	243369	6629624	Treatment
FL-WSG-WIL-26-D		WSGW_DNG_Cleared	244371	6628700	Treatment
FL-NWS-WIL-27-S		NWSDSW_Good	242640	6628724	Treatment
FL-RFB-WIL-28		WSDSF_Good	240128	6628435	Bushfire treatment
FL-RFB-WIL-29		WSDSF_Good	241287	6628511	Bushfire treatment

APPENDIX F:
WILLEROI WEST FAUNA MONITORING – SURVEY CO-ORDINATES

(AMBS, 2017a)

Table F-1: Willeroi West Fauna Survey Co-ordinates

Site	Easting	Northing
Fauna		
FT01	243637	6626045
FT02	244034	6626819
FT03	243935	6629739
FT04	242724	6629909
FT05	243006	6628916
FT06	241555	6628590

APPENDIX G:
WILLEROI WEST BASELINE CONDITION REPORT

The following report has been prepared from *Maules Creek Coal Mine and Tarrawonga Coal Mine: Flora and Habitat Monitoring of Offset Areas – 2017* (AMBS, 2017a), *Fauna Monitoring of the Maules Creek and Tarrawonga Mine Offset Areas – Spring 2017* (AMBS, 2017b) and *Bird Surveys in the Maules Creek and Tarrawonga Coal Mine Offset Areas – Winter 2017* (AMBS, 2017c), with the monitoring methods and results extracted to create a Baseline Condition Report specific to the Willeroi West offset area.

Eight flora and six fauna monitoring sites were established in the Tarrawonga Mine offset property (Willeroi) to meet BMP requirements and to complement experimental design of the monitoring program in the Maules Creek Mine offsets.

Flora Monitoring Methods

Flora monitoring took place on 24 – 27 October 2017. At each site three 20 x 50 m plots were established and surveyed. Plots were placed at least 50 m apart. Plot configuration was consistent with the BioBanking Assessment Methodology (OEH 2014). Each plot was bisected by a 50 m transect line, running north to south, with each end of the transect line marked with a permanent star picket. A 20 m x 20 m sub-plot was marked within and at the origin (southern end) of the plot. The location of the southern picket was recorded using a GPS. Data collection expanded upon the BioBanking Assessment Methodology (OEH 2014), using additional survey methods and attributes. Attributes that were recorded in the 20 x 50 m plots are described in **Table G-1** and attributes recorded in the 20 x 20 m sub-plot in **Table G-2.**

Table G-1: Attributes Recorded in 20 x 50 m Plots

Habitat Surveys – Observational and Site Features			
Number	**Attribute**	**Assessment Techniques**	**Activity Undertaken**
1	Site location	Waypoints	Waypoints recorded at the southern post of the plot.
2	Site photographs	North to south and south to north along transect.	Camera place on top of star picket. Photograph centred on the 50m transect tape. No person or equipment in image.
3	Habitat Feature: Tree Hollows	Count 20 x 50m plot	Count all hollows >5cm - 10cm occurring in plot. Count all hollows >10cm occurring in plot. Record comments where applicable. If absent record as zero.
4	Habitat Feature: Fallen timber	Count 20 x 50m plot	Count all fallen timber >10cm diameter and >50cm in length occurring in plot. Estimate combined length. Record comments where applicable. If absent record as zero.
5	Proximity to water	Observation General area	Record in metres type and distance of standing and ephemeral water occurring <500m from the site. This includes dams, streams and drainage lines. Record comments where applicable. If absent record as zero.
6	Proximity to rocks, caves and over hangs	Observation General area	Record in metres distance to large habitat rocks, caves or overhangs occurring <300m from the site. Record comments where applicable. If absent record as zero.
7	Evidence of extensive erosion or waterlogging disturbing native vegetation	Observation General area	Record in metres distance to erosion or waterlogging occurring <300m from the site. Record comments where applicable. If absent record as zero.

Table G1: (Continued)
Attributes Recorded in 20 x 50 m plots

Habitat Surveys – Observational and Site Features			
Number	**Attribute**	**Assessment Techniques**	**Activity Undertaken**
8	Dense stands of regeneration (*Callitris glaucophylla*) that may require thinning	Observation General area	Record presence or absence of dense stands of *Callitris glaucophylla* occurring within or directly adjacent to the plot. Record comments where applicable. If absent record as zero.
9	Evidence of past disturbance	Observation 20 x 50m plot	Record presence or absence of disturbance and document disturbance type. This include, but is not limited to, fire, logging, tree thinning, roads/tracks, grazing. If absent record as zero.
10	Dieback of Eucalypts that could be due to water stress	Observation 20 x 50m plot	Record presence or absence of Eucalypt dieback and description of site topography. Record comments where applicable. If absent record as zero.
11	Presence/absence of Noisy Miners	Observations/Call identification General area	Record presence or absence of Noisy Miners and/or Yellow-eared Miners if not distinguishable. Record comments where applicable. If absent record as zero.
12	Presence/absence of other Honeyeaters	Observation/Call identification General area	Record presence or absence of other Honeyeaters. Record habitat and comments where applicable. If absent record as zero.
13	Evidence of disturbance by pest animals.	Observation 20 x 50m plot	Record presence or absence of pest animals. Evidence includes sighting, scats, tracks or obvious grazing. This includes but is not limited to livestock, fox, rabbit, deer, pigs, goats. Record comments where applicable. If absent record as zero.
14	Presence of flowering Eucalypts	Observation 20 x 50m plot	Record presence or absence of flowering Eucalypts. Where flowering occurs record species and proportion of site containing the flowering species (e.g., *Eucalyptus crebra* <5%). Record comments where applicable. If absent record as zero.
15	Regeneration of canopy species	Observation 20 x 50m plot	Record presence or absence of canopy species regeneration. Where possible record species and proportion of site containing the regenerating species (i.e., *Eucalyptus crebra* 5-15%). Record comments where applicable. If absent record as zero.
16	Overall vegetation condition (Resilience)	Observation 20 x 50m plot	Record vegetation condition on a scale of 1-4, where 1 is Very Poor and 4 is Good. (e.g., Good: <10% weed and/or healthy strata and high assemblage diversity. Moderate: 10-30% weed and/or minor stratum dieback and moderate assemblage diversity. Poor: 30-80% weed and/or moderate stratum dieback and low assemblage diversity. Very Poor: >80% weed and/or extensive stratum dieback /extremely reduced diversity)
17	Notes	Observations	Description of distinct site features including soil, unique disturbance, unusual vegetation, landscape and land use history.

Table G1: (Continued)
Attributes Recorded in 20 x 50 m Plots

Habitat Surveys – Observational and Site Features			
Number	**Attribute**	**Assessment Techniques**	**Activity Undertaken**
18	Native overstorey cover (NOS)	At 10 points along a 50 m transect	Record height of highest layer in metres. Record health of overstorey (on a 1-3 scale in which 1 is poor and 3 is good). Record projected foliage cover directly over the selected point and within the boundaries of a confined shape (e.g., 5cm tube).
19	Native midstorey cover (NMS)	At 10 points along a 50 m transect	Record height of highest layer in metres. Record health of midstorey (on a 1-3 scale in which 1 is poor and 3 is good). Record projected foliage cover directly over the selected point and within the boundaries of a confined shape (e.g. 5cm tube).
20	Exotic overstorey and midstorey cover	At 10 points along a 50m transect	Record height of highest layer in metres. Record health of midstorey (on a 1-3 scale in which 1 is poor and 3 is good). Record projected foliage cover directly over the selected point and within the boundaries of a confined shape (e.g., 5cm tube).
21	Native ground cover (grasses)	At 50 points along a 50m transect	Record occurrence or hit at each point. Record only one hit, even if multiple “hits” of native grasses occur at the point.
22	Native ground cover (forb)	At 50 points along a 50m transect	Record occurrence or hit at each point. Record only one hit, even if multiple “hits” of native grasses occur at the point.
23	Native ground cover (other)	At 50 points along a 50m transect	Record occurrence or hit at each point. Record only one hit, even if multiple “hits” of native ground covers occur at the point. Cryptogams to be included as a native other.
24	Exotic ground cover	At 50 points along a 50m transect	Record occurrence or hit at each point. Record only one hit, even if multiple “hits” of exotic species occur at the point.
25	Native woody species <1m	At 50 points along a 50m transect	Native species with a woody stem less than 1 m in height. Includes shrubs too small to meet native midstorey criteria.
26	Overall site cover: Cryptogam cover	Average within 20x20m plot	Record cryptogam as a percentage of the site. Record in 5% increments. Cryptogams occurring on soil and rocks are included in the assessment.
27	Overall site cover: Rock Cover	Average within 20x20m plot	Record rock cover as a percentage of the site. Record in 5% increments.
28	Overall site cover: Bare ground	Average within 20x20m plot	Record bare ground as a percentage of the site. Record in 5% increments. Bare ground excludes rocks.
29	Overall site cover: Litter	Average within 20x20m plot	Record litter cover as a percentage of the site. Record in 5% increments. Litter cover includes all dead material but excludes cryptogams and rocks.
30	Structural Assessment: Canopy	Average within 20x20m plot	Record percentage cover of Vegetation canopy. Canopy is classified as vegetation >8 metres high. Record the height range of canopy species in metres.
31	Structural Assessment: Midstorey 1	Average within 20x20m plot	Record percentage cover of Mid 1 vegetation. Mid 1 is classified as vegetation <8 and >5 metres. Record the height range of Mid 1 species in metres.
32	Structural Assessment: Midstorey 2	Average within 20x20m plot	Record percentage cover of Mid 2 vegetation. Mid 2 is classified as vegetation <5 and >1 metres. Record the height range of Mid 2 species in metres.

Table G-2: Attributes Recorded in 20 x 50 m Plots

Floristic Survey and Structural Features			
Number	**Attribute**	**Assessment Techniques**	**Activity Undertaken**
33	Structural Assessment: Ground layer	Average within 20x20m plot	Record percentage cover of living ground layer vegetation. The ground layer is classified as vegetation <1metre. Record the height range of ground layer species in centimetres.
34	Tree Species Size Classing	Count within 20 x 20m sub-plot	Record size classes of all tree species present. The classes include <1m,1-2m,2-5m,5-10m,10-15m,15-20m,20-25m,25-30m,>30m. Count the number of each species which occurs within each class. Record the total number of each species as the sum of all records. Only plants rooted within the plot. Only tree canopy species.
35	Flora species richness	Count within 20 x 20m sub-plot	Record presence of all flora species within subplot. Record with sample identification and field name where applicable. Identify specimens using floristic keys.

Flora Monitoring Results

Native plant species (NPS) richness ranged from 56 to 95 across all plots (**Table G-3**). Evidence of overstorey regeneration was present in 17 out of 24 plots. The regenerating areas were largely composed of *Callitris* and *Eucalyptus* species. Sites VS41 and VS43 contained the tallest overstorey trees (14m). VS43 was found to contain the tallest midstorey regenerating individuals with the health of overstorey and midstorey compositions recorded highest on site VS43-3 (2-3).

No exotic species were found within regenerating midstorey canopy (**Table G-3**). Site VS47 showed the highest native grass cover (50%) and highest exotic ground cover (25%), compared to other sites. The most native forbs were found on sites VS42 and VS41 (26), and the most native woody plants on site VS43 (1).

Table G-3: Flora Monitoring Results – Structural Part 1

Site number	NPS	Over-storey regeneration (1=y, 0=n)	Over-storey regeneration (% of site)	Regenerating species name	NOS Height (m) (Avg records)	NOS Health (P=1, M=2, G=3) 3 highest	NOS % (Avg 10 records)	NMS Height (m) (Avg records)	NMS Health (P, M, G) (Avg records) (P=1, M=2, G=3)	NMS % (Avg 10 records)
VS40-1	56	1.00	5-15%	*Callitris glaucophylla, Eucalyptus melliodora, Angophora floribunda*	0.00	0.00	0.00	6.00	3.00	4.00
VS40-2	60	1.00	<5%	*Callitris glaucophylla, Eucalyptus melliodora*	0.00	0.00	0.00	0.00	0.00	0.00
VS40-3	66	1.00	<5%	*Eucalyptus melliodora*	0.00	0.00	0.00	0.00	0.00	0.00
VS41-1	94	1.00	<5%	*Callitris glaucophylla, Angophora floribunda*	0.00	0.00	0.00	0.00	0.00	0.00
VS41-2	90	1.00	<5%	*Callitris glaucophylla*	0.00	0.00	0.00	0.00	0.00	0.00
VS41-3	86	1.00	5-15%	*Callitris glaucophylla, Eucalyptus albens, Angophora floribunda, Brachychiton populneus*	14.00	3.00	1.50	7.00	3.00	1.00
VS42-1	72	1.00	<5%	*Callitris glaucophylla, Eucalyptus melliodora*	0.00	0.00	0.00	0.00	0.00	0.00
VS42-2	60	1.00	15-25%	*Callitris glaucophylla*	0.00	0.00	0.00	0.00	0.00	0.00
VS42-3	59	1.00	15-25%	*Callitris glaucophylla, Eucalyptus albens*	11.00	3.00	3.00	6.00	3.00	8.00
VS43-1	90	1.00	25-50%	*Callitris glaucophylla, Eucalyptus albens*	10.00	3.00	3.00	4.00	3.00	5.00
VS43-2	88	1.00	>50%	*Callitris glaucophylla, Eucalyptus albens, Angophora floribunda, Brachychiton populneus*	9.00	2.00	3.00	6.25	2.00	9.00

Table G-3 (Continued)
Flora Monitoring Results – Structural Part 1

Site number	NPS	Over-storey regeneration (1=y, 0=n)	Over-storey regeneration (% of site)	Regenerating species name	NOS Height (m) (Avg records)	NOS Health (P=1, M=2, G=3) 3 highest	NOS % (Avg 10 records)	NMS Height (m) (Avg records)	NMS Health (P, M, G) (Avg records) (P=1, M=2, G=3)	NMS % (Avg 10 records)
VS43-3	78	1.00	25-50%	*Callitris glaucophylla, Angophora floribunda, Brachychiton populneus*	14.00	3.00	7.00	2.80	3.00	1.50
VS44-1	80	1.00	<5%	*Callitris glaucophylla*	0.00	0.00	0.00	0.00	0.00	0.00
VS44-2	85	0.00			0.00	0.00	0.00	0.00	0.00	0.00
VS44-3	95	1.00	<5%	*Callitris glaucophylla*	0.00	0.00	0.00	0.00	0.00	0.00
VS45-1	83	0.00			0.00	0.00	0.00	0.00	0.00	0.00
VS45-2	68	0.00			0.00	0.00	0.00	0.00	0.00	0.00
VS45-3	78	1.00	<5%	*Callitris glaucophylla*	0.00	0.00	0.00	0.00	0.00	0.00
VS46-1	71	0.00			0.00	0.00	0.00	0.00	0.00	0.00
VS46-2	69	0.00			0.00	0.00	0.00	0.00	0.00	0.00
VS46-3	71	1.00	<5%	*Callitris glaucophylla*	0.00	0.00	0.00	4.00	3.00	2.00
VS47-1	71	0.00			0.00	0.00	0.00	0.00	0.00	0.00
VS47-2	67	1.00	<5%	*Callitris glaucophylla, Brachychiton populneus*	0.00	0.00	0.00	5.50	3.00	1.00
VS47-3	59	0.00	0.00		0.00	0.00	0.00	0.00	0.00	0.00

Table G-4: Flora Monitoring Results – Structural Part 2

Site Number	Exotic % cover mid/ canopy (Avg 10 records)	Sum NG hits	Avg Native ground cover (grass) # hits/50	Sum NF hits	Avg Native ground cover (forb) # hits/50	Sum NO hits	Avg Native ground cover (other) #hits/50	Sum exotic hits	Avg Exotic plant cover # hits/50	Sums NWS hits	Avg native woody species (NWS) <1m #hits/50
VS40-1	0.00	41.00	0.82	23.00	0.46	2.00	0.04	3.00	0.06	0.00	0.00
VS40-2	0.00	36.00	0.72	32.00	0.64	8.00	0.16	7.00	0.14	0.00	0.00
VS40-3	0.00	46.00	0.92	16.00	0.32	10.00	0.20	5.00	0.10	0.00	0.00
VS41-1	0.00	44.00	0.88	18.00	0.36	1.00	0.02	5.00	0.10	0.00	0.00
VS41-2	0.00	35.00	0.70	26.00	0.52	1.00	0.02	9.00	0.18	0.00	0.00
VS41-3	0.00	29.00	0.58	14.00	0.28	1.00	0.02	1.00	0.02	0.00	0.00
VS42-1	0.00	23.00	0.46	30.00	0.60	3.00	0.06	8.00	0.16	0.00	0.00
VS42-2	0.00	34.00	0.68	21.00	0.42	3.00	0.06	4.00	0.08	0.00	0.00
VS42-3	0.00	16.00	0.32	26.00	0.52	0.00	0.00	0.00	0.00	3.00	0.06
VS43-1	0.00	31.00	0.62	13.00	0.26	9.00	0.18	5.00	0.10	1.00	0.02
VS43-2	0.00	26.00	0.52	9.00	0.18	5.00	0.10	10.00	0.20	1.00	0.02
VS43-3	0.00	26.00	0.52	4.00	0.08	9.00	0.18	3.00	0.06	3.00	0.06
VS44-1	0.00	41.00	0.82	22.00	0.44	2.00	0.04	9.00	0.18	0.00	0.00
VS44-2	0.00	37.00	0.74	9.00	0.18	16.00	0.32	8.00	0.16	2.00	0.04

Table G-4 (Continued)
Flora Monitoring Results – Structural Part 2

Site Number	Exotic % cover mid/canopy (Avg 10 records)	Sum NG hits	Avg Native ground cover (grass) # hits/50	Sum NF hits	Avg Native ground cover (forb) # hits/50	Sum NO hits	Avg Native ground cover (other) #hits/50	Sum exotic hits	Avg Exotic plant cover # hits/50	Sums NWS hits	Avg native woody species (NWS) <1m #hits/50
VS44-3	0.00	42.00	0.84	8.00	0.16	5.00	0.10	14.00	0.28	0.00	0.00
VS45-1	0.00	47.00	0.94	5.00	0.10	2.00	0.04	14.00	0.28	0.00	0.00
VS45-2	0.00	32.00	0.64	20.00	0.40	0.00	0.00	7.00	0.14	1.00	0.02
VS45-3	0.00	45.00	0.90	10.00	0.20	2.00	0.04	18.00	0.36	0.00	0.00
VS46-1	0.00	34.00	0.68	19.00	0.38	0.00	0.00	8.00	0.16	0.00	0.00
VS46-2	0.00	35.00	0.70	19.00	0.38	0.00	0.00	5.00	0.10	0.00	0.00
VS46-3	0.00	40.00	0.80	9.00	0.18	0.00	0.00	3.00	0.06	0.00	0.00
VS47-1	0.00	50.00	1.00	13.00	0.26	17.00	0.34	25.00	0.50	0.00	0.00
VS47-2	0.00	48.00	0.96	8.00	0.16	4.00	0.08	33.00	0.66	0.00	0.00
VS47-3	0.00	49.00	0.98	21.00	0.42	0.00	0.00	22.00	0.44	0.00	0.00

Neither hollow bearing trees nor cracks bearing habitat were recorded across the sites. No standing dead timer was found. Fallen tree logs were found in just under half of the sites (42%) (**Table G-5**).

Table G-5: Habitat Flora Results

Site number	Hollows 5-10cm	# hollows >10cm	# cracks with habitat potential	Standing dead timber (>8m)	# fallen logs >10cm diameter and 50cm length	length of fallen logs (m)	Proximity to water (m)	Proximity to rocks, caves, overhangs
VS40-1	0	0	0	0	12	6	NA	Unknown
VS40-2	0	0	0	0	0	0	NA	Unknown
VS40-3	0	0	0	0	30	15	NA	Unknown
VS41-1	0	0	0	0	4	7	100 w to farm dam	800m west
VS41-2	0	0	0	0	3	3	100 w to farm dam	800m west
VS41-3	0	0	0	0	8	21	100 w to farm dam	800m west
VS42-1	0	0	0	0	12	6	NA	Unknown
VS42-2	0	0	0	0	4	2	NA	Unknown
VS42-3	0	0	0	0	10	5	NA	Unknown
VS43-1	0	0	0	0	0	0	100m E to Maules Ck	1.5km E
VS43-2	0	0	0	0	3	5	100m E to Maules Ck	1.5km E
VS43-3	0	0	0	0	0	0	100m E to Maules Ck	1.5km E
VS44-1	0	0	0	0	0	0	1-2Km to Maules Ck	3km N
VS44-2	0	0	0	0	0	0	1-2Km to Maules Ck	3km N
VS44-3	0	0	0	0	0	0	1-2Km to Maules Ck	3km N

Table G-5 (Continued)
Habitat Flora Results

Site number	Hollows 5-10cm	# hollows >10cm	# cracks with habitat potential	Standing dead timber (>8m)	# fallen logs >10cm diameter and 50cm length	length of fallen logs (m)	Proximity to water (m)	Proximity to rocks, caves, overhangs
VS45-1	0	0	0	0	0	0	NA	Unknown
VS45-2	0	0	0	0	2	1	NA	Unknown
VS45-3	0	0	0	0	0	0	NA	Unknown
VS46-1	0	0	0	0	0	0	150m SW to farm dam	117pprox.. 3 Km N
VS46-2	0	0	0	0	0	0	150m SW to farm dam	117pprox.. 3 Km N
VS46-3	0	0	0	0	0	0	150m SW to farm dam	117pprox.. 3 Km N
VS47-1	0	0	0	0	0	0	NA	Unknown
VS47-2	0	0	0	0	0	0	NA	Unknown
VS47-3	0	0	0	0	0	0	NA	Unknown

Fauna Monitoring Methods

Vertebrate fauna surveys were undertaken at six survey sites in the Tarrawonga offset area (four sites in remnant vegetation and two sites in revegetation areas). The surveys were undertaken from 6 to 14 November 2017 and 27 November to 1 December 2017.

At each remnant vegetation survey site, survey techniques included harp traps, ultrasonic call recording, spotlighting, call-playback, diurnal bird surveys and hand searches. Remote cameras were deployed at each site on the first field trip and collected at the end of the second field trip. Frog and tadpole surveys were also undertaken in suitable habitat (not necessarily in the same sites as the other sampling techniques). Opportunistic observations of signs of nocturnal birds and other fauna were noted throughout the field survey period.

Fauna survey techniques implemented within the revegetation areas included diurnal bird surveys, reptile surveys, spotlighting, camera traps and ultrasonic call detectors (Anabat). Harp traps were not used as these areas currently have no flyways, and call playback for owls was not undertaken, as owls that respond (if any) are likely to be coming from other areas, i.e., areas that are more wooded than the revegetation domains.

Harp Traps

At each standard survey site, two harp traps were deployed for two nights (i.e., four harp trap nights per site in total). Traps were checked each morning within three hours of dawn. Any captured microbats were placed in a calico bag, identified, and released at dusk the same day. Ultrasonic Call Recording (Anabat). At each standard survey site and revegetation site, two Anabat units (either Anabat Express or Anabat SD2) were deployed for two nights. Anabat Express units were set to the automatic 'night only' recording mode. Anabat SD2 units were programmed to operate between 18:30 and 07:30 hours. The sensitivity was set to between seven and eight and the data division ratio was set to eight.

Camera Traps

At each standard survey site and revegetation site, two remote cameras (Scout Guard) were deployed and left in-situ for a minimum of 14 days and nights. At each site, one camera was baited with universal bait, and one was baited with a tin of sardines. The bait was placed approximately 2-3 m from the camera. Cameras were programmed to record three images each time they were triggered.

Reptile Search

At each standard survey site and revegetation site, active searches of potential reptile habitats were undertaken. At each site two 30 person-minute searches (i.e., a total of 60 person minutes per site in total) were undertaken on different days. Searches were undertaken between 10:00 and 13:00 hours wherever possible.

Call-Playback

At each standard survey site, call-playback was undertaken on two nights (non-consecutive when possible). During each survey an initial five-minute listening period was followed by five minutes call-playback and five minutes of listening for each species. Species included in the call-playback survey were the Masked Owl (Tyto novaehollandiae) and Barking Owl (Ninox connivens). Spotlighting of the surrounds was performed at the conclusion of the call-playback survey.

Spotlighting

At each standard survey site and revegetation site, spotlighting was undertaken on two nights (non-consecutive when possible). The survey involved two people walking a 200 m transect and identifying

vertebrate fauna observed within 50 m of either side. Each survey was performed for 60 person-minutes. The survey site order was changed for some sites on the second evening in order to limit the effects of temperature on survey results.

Bird Survey

Winter and spring baseline bird surveys were conducted in 2017 (AMBS, 2017a; 2017b).

Field surveys in winter took place over an 8-day period in late July, across 81 sites. Each site was surveyed for a minimum of 5 minutes to record the target species, Swift Parrot (*Lathamus discolour*), as well as indicator species (blossom feeding lorikeets and friarbirds) and assess relevant habitat. Of the 112 bird species recorded, nine were listed as threatened under the NSW *Threatened Species Conservation Act* 1995 within the study area. No Swift Parrots were recorded during these surveys.

In spring, diurnal bird surveys were undertaken on two separate mornings within three hours of dawn. Each standard survey and revegetation site was assessed for 20 minutes. Surveyors slowly walked a transect approximately 200 m long and identified all birds observed or heard within and outside of a two-hectare area. Of the 87 bird species recorded, eight were listed as threatened under the NSW *Threatened Species Conservation Act* 1995 in the study area (**Table G-6**).

Frog and Tadpole Search

At each frog site, a short listening period was undertaken (approximately three minutes), followed by spotlight searches for 30 person-minutes, on two separate evenings. All amphibian species observed or heard were identified and recorded. Tadpole searches were undertaken on one occasion at each tadpole site for a minimum of 30 person-minutes. During the surveys, visual searches were undertaken for 15 minutes, followed by up to ten sweeps of the waterbody using a hand-held dip net.

Limitations

A summary of the limitations or modifications to the surveys included: Remote camera monitoring at fifteen sites recorded images for less than the target survey effort (i.e., 28 camera nights). At fourteen sites this was due to the memory cards filling up with photos of moving groundcover, and mostly impacted revegetation sites. Most sites were only reduced by a few nights each (FST02- 20 nights, FST04 – 25 nights), with the exception of sites that had greater grass cover (FST03 17 nights, FST05 9 nights). Due to malfunctioning Anabat detectors the number of Anabat nights was reduced to one at FST04 however this was compensated for by setting up two Anabats for one night later in the survey.

Thunderstorms were recorded in the afternoon of 6 November. Moderate to strong winds were recorded in the early evening of 6 November.

Weather conditions

Weather conditions within the offset areas during the survey period were generally warm to very warm during the day (20.0°C to 33.4°C) and cold to mild at night (6.1°C to 20.1°C). The survey conditions were dry for most of the active survey periods. Approximately 30-50 mm of rainfall were recorded mid-November between the two active survey periods (**Table G-7**). Localized showers occurred within the last days of surveys.

The rainfall total for the three months before surveys began was 102.2 mm at Teston South AWS.

Fauna Monitoring Results

One hundred and fifty one (151) fauna species were found across the six fauna monitoring sites (including six amphibians, 87 birds, 36 mammals and 22 reptiles). Fifteen threatened species were identified, including eight birds, four microbats and one arboreal mammal. Eight species of invasive fauna were recorded (Common Starling, Cat, Goat, Dog, Pig, Deer, Rat and Fox) at varying frequencies across all six sites (**Table G-6**).

Table G-6: Fauna Monitoring Results

Scientific Name	Common Name	FST01	FST02	FST03	FST04	FST05	FST06
Amphibia							
Crinia signifera	Common Eastern Froglet	2					
Limnodynastes dumerilii	Eastern Banjo Frog				1		
Litoria latopalmata	Broad-palmed Frog			5			36
Litoria peronii	Peron's Tree Frog			3			16
Litoria rubella	Desert Tree Frog			1			
Litoria wilcoxii	Wilcox's Frog						1
Aves							
Acanthagenys rufogularis	Spiny-cheeked Honeyeater	2	1	3	4	1	
Acanthiza chrysorrhoa	Yellow-rumped Thornbill				1		
Acanthiza lineata	Striated Thornbill						4
Acanthorhynchus tenuirostris	Eastern Spinebill	1					2
Aegotheles cristatus	Australian Owlet-Nightjar	2	2	3	1		11
Alisterus scapularis	Australian King-parrot			3			
Anthochaera carunculata	Red Wattlebird			2		5	
Aprosmictus erythropterus	Red-winged Parrot	3	1	3			
Aquila audax	Wedge-tailed Eagle				1		1
Artamus cyanopterus cyanopterus	**Dusky Woodswallow**	10			2		
Artamus superciliosus	White-browed Woodswallow	1					
Cacatua galerita	Sulphur-crested Cockatoo		1		7	1	
Cacomantis flabelliformis	Fan-tailed Cuckoo			2			1
Cacomantis variolosus	Brush Cuckoo		2				
Centropus phasianinus	Pheasant Coucal		1				
Chalcites basalis	Horsfield's Bronze-Cuckoo	1					
Chalcites osculans	Black-eared Cuckoo		1				
Chenonetta jubata	Australian Wood Duck			6			
Chthonicola sagittata	**Speckled Warbler**				2		2
Cincloramphus mathewsi	Rufous Songlark	3		6	10	2	
Climacteris picumnus victoriae	**Brown Treecreeper (eastern subspecies)**	2	4	3			
Cocomantis pallidus	Pallid Cuckoo	1					

Table G-6 (Continued)
Fauna Monitoring Results

Scientific Name	Common Name	FST01	FST02	FST03	FST04	FST05	FST06
Aves							
Colluricincla harmonica	Grey Shrike-thrush			1			
Coracina novaehollandiae	Black-faced Cuckoo-shrike				1	3	
Coracina tenuirostris	Cicada Bird	1	2				
Cormobates leucophaeus	White-throated Treecreeper	2	1				3
Coturnix pectoralis	Stubble Quail					1	
Cracticus nigrogularis	Pied Butcherbird					2	
Cracticus torquatus	Grey Butcherbird			1			1
Dacelo novaeguineae	Laughing Kookaburra	7	1				3
Daphoenositta chrysoptera	**Varied Sittella**		6				
Dicaeum hirundinaceum	Mistletoebird		1	1	1		1
Eolophus roseicapillus	Galah		8	2		14	
Eopsaltria australis	Eastern Yellow Robin	3	2				3
Eudynamys orientalis	Eastern Koel		1				
Eurostopodus mystacalis	White-throated Nightjar	1		1			
Eurystomus orientalis	Dollarbird		1	1			
Falco cenchroides	Nankeen Kestrel					1	
Falcunculus frontatus	Crested Shrike-tit	1					
Geopelia humeralis	Bar-shouldered Dove			1			
Geopelia striata	Peaceful Dove				2		
Gerygone fusca	Western Gerygone	2			1		
Gerygone olivacea	White-throated Gerygone		3				3
Glossopsitta concinna	Musk Lorikeet				7		
Glossopsitta pusilla	**Little Lorikeet**	2	6	25			
Grallina cyanoleuca	Magpie-lark			3	2		
Gymnorhina tibicen	Australian Magpie	2	1	6	2	2	1
Hirundo neoxena	Welcome Swallow	1					
Hirundo nigricans	Tree Martin	2					
Lichenostomus chrysops	Yellow-faced Honeyeater		9				10
Lichenostomus fuscus	Fuscous Honeyeater	34	4				
Lichenostomus leucotis	White-eared Honeyeater	4	1	1			2
Lichenostomus virescens	Singing Honeyeater	1		2		1	
Malurus cyaneus	Superb Fairy-wren	1	9	4	1		6
Manorina melanocephala	Noisy Miner		3	2	4		
Melanodryas cucullata cucullata	**Hooded Robin (south-eastern form)**	1					1

Table G-6 (Continued)
Fauna Monitoring Results

Scientific Name	Common Name	FST01	FST02	FST03	FST04	FST05	FST06
Aves							
Melithreptus lunatus	White-naped Honeyeater		6				
Microeca fascinans	Jacky Winter	2	1		1		
Myiagra inquieta	Restless Flycatcher		2				
Myiagra rubecula	Leaden Flycatcher		2				
Neophema pulchella	**Turquoise Parrot**	2	2	1	3		
Ninox novaeseelandiae	Southern Boobook			1		1	3
Ocyphaps lophotes	Crested Pigeon			6		1	
Oriolus sagittatus	Olive-backed Oriole	1	1				
Pachycephala pectoralis	Golden Whistler		1				
Pachycephala rufiventris	Rufous Whistler	6	6	2	1	1	3
Pardalotus punctatus	Spotted Pardalote	1			1		4
Petroica goodenovii	Red-capped Robin				1		
Phaps chalcoptera	Common Bronzewing	2		4	2		6
Philemon corniculatus	Noisy Friarbird	3	5	8	1		
Platycercus elegans	Crimson Rosella			2			
Platycercus eximius	Eastern Rosella			3	3		
Plectorhyncha lanceolata	Striped Honeyeater	4	2	4	4		1
Podargus strigoides	Tawny Frogmouth	4	2	1			2
Psephotus haematonotus	Red-rumped Parrot			2			
Rhipidura albiscarpa	Grey Fantail		1				1
Rhipidura leucophrys	Willie Wagtail	16	3	4		2	3
Scythrops novaehollandiae	Channel-billed Cuckoo						1
Sericornis frontalis	White-browed Scrubwren						2
Smicrornis brevirostris	Weebill						3
Stagonopleura guttata	**Diamond Firetail**		1				
Strepera graculina	Pied Currawong				1		2
Struthidea cinerea	Apostlebird			1	15		
*Sturnus vulgaris**	Common Starling			1			
Todiramphus sanctus	Sacred Kingfisher	3	4	4		1	
Turnix varia	Painted Button-quail		1				
Zosterops lateralis	Silvereye	4					
Mammalia							
Muridae spp.			1				
Unidentified	unidentified small mammal	2		1		3	

Table G-6 (Continued)
Fauna Monitoring Results

Scientific Name	Common Name	FST01	FST02	FST03	FST04	FST05	FST06
Mammalia							
(Microchiroptera suborder)	unidentified microbat	6	15				
Acrobates sp. (previously pygmaeus)	unidentified Feathertail Glider	1	1				
Austronomus australis	White-striped Free-tailed Bat	2	1	4	3	2	7
*Canis lupus**	Domestic Dog	2					
*Capra hircus**	Goat	2	2		3	1	3
Chalinolobus dwyeri	**Large-eared Pied Bat**	1	2	**1**		1	
Chalinolobus gouldii	Gould's Wattled Bat	1	1	1	1	1	1
Chalinolobus morio	Chocolate Wattled Bat	1	2	1	1	1	1
*Dama dama**	Fallow Deer				2		
*Felis catus**	Cat				4		
Macropod sp.	unidentified macropod	2			2	1	17
Macropus giganteus	Eastern Grey Kangaroo	9		10	22	14	2
Macropus robustus	Common Wallaroo	1		2		2	6
Miniopterus schreibersii oceanensis	**Eastern Bentwing-bat**			1			1
Mormopterus (Ozimops) petersi	Inland Free-tailed Bat	1	1	1	1	1	1
Mormopterus (Ozimops) planiceps	South-eastern Free-tailed Bat	1	2	2	1	1	1
Mormopterus sp.	unidentified Mormopterus				1		
Nyctophilus corbeni	**Corben's Long-eared Bat**		1				
Nyctophilus geoffroyi	Lesser Long-eared Bat		6	14			
Nyctophilus gouldi	Gould's Long-eared Bat	1	1	1			
Nyctophilus sp.	unidentified Nyctophilus	1	1	1	1	1	1
Petaurus norfolcensis	**Squirrel Glider**		1		1		
Pseudocheirus peregrinus	Common Ringtail Possum		10	3	1		1
*Rattus rattus**	Black Rat	1					1
Rhinolophus megaphyllus	Eastern Horseshoe Bat	1			1		1
Saccolaimus flaviventris	**Yellow-bellied Sheath-tailed Bat**		1		1		1
Scotorepens balstoni	Inland Broad-nosed Bat	1	1	2	1		1
Scotorepens greyii/Scotorepens unnamed	Little Broad-nosed Bat/Central-eastern Broad-nosed Bat	1	1	1			1
*Sus scrofa**	Pig	2	4	6	16		20
Tachyglossus aculeatus	Short-beaked Echidna						1
Trichosurus vulpecula	Common Brushtail Possum	13	19	1	1		6

Table G-6 (Continued)
Fauna Monitoring Results

Scientific Name	Common Name	FST01	FST02	FST03	FST04	FST05	FST06
Mammalia							
Vespadelus darlingtoni	Large Forest Bat	13	9	5			2
*Vulpes vulpes**	Red Fox	3	3	1	1	1	3
Wallabia bicolor	Swamp Wallaby	3	1	2	3		2
Reptilia							
Amphibolurus muricatus	Jacky Lizard		1				
Anomalopus leuckartii	Two-clawed Worm-skink	1	1	2			3
Carlia vivax	Tussock Rainbow-skink			6			
Cryptoblepharus pulcher	Elegant Snake-eyed Skink				1		
Ctenotus robustus	Robust Ctenotus	1	1				
Delma plebeia	Leaden Delma						3
Diporiphora nobbi	Nobbi			2			
Egernia cunninghami	Cunningham's Skink			2			
Egernia striolata	Tree Skink	6					1
Eulamprus quoyii	Eastern Water-skink			2			
Geckonid	unidentified Gecko						1
Gehyra dubia	Dubious Dtella	1	1				
Hemiergis talbingoensis	Eastern Three-toed Earless Skink	1					
Heteronotia binoei	Bynoe's Prickly Gecko						1
Lygisaurus foliorum	Tree-base Litter-skink	2					1
Morethia boulengeri	South-eastern Morethia Skink		2	5			
Nebulifera robusta	Robust Velvet Gecko		2		1		1
Pogona barbata	Bearded Dragon		1	6	1		
Pseudonaja textilis	Eastern Brown Snake		1				
Strophurus sp.	unidentified Strophurus				1		
Strophurus williamsi	Eastern Spiny-tailed Gecko				5		
Underwoodisaurus milii	Thick-tailed Gecko			4			

Table G-7: Climate Data During the Survey Period

Date	Teston South AWS			Barraba Post Office		
	Temp Max (°C)	Temp Min (°C)	Rainfall (mm)	Temp Max (°C)	Temp Min (°C)	Rainfall (mm)
6/11/17	29.8	16	3.4	27.8	8.9	8.0
7/11/17	26.2	6.5	0.2	24.6	6.1	2.2
8/11/17	25.9	14.9	-	25.9	11.0	-
9/11/17	27.3	11.6	-	26.4	9.0	-
10/11/17	27.5	16	-	27.0	8.2	-
11/11/17	28.2	14.8	-	27.0	8.0	-
12/11/17	27.8	15.8	-	27.6	7.5	-
13/11/17	28.7	12.3	-	27.7	10	-
14/11/17	28.4	11.9	-	27.1	8.9	-
15/11/17	29.6	14.5	-	No data	9.6	-
16/11/17	25.7	17.8	9.2	27.9	No data	-
17/11/17	29.2	15.7	29.4	29.0	12.0	15.4
18/11/17	20.1	15.9	21.8	20.0	15.0	7.0
19/11/17	26.6	15.9	3.6	25.9	14.0	16.0
20/11/17	27.6	14	-	26.5	10.1	2.0
21/11/17	25.9	16	2.8	26.7	10.5	-
22/11/17	28	15.1	1.4	No data	9.0	-
23/11/17	26.8	12.9	0.2	No data	No data	-
24/11/17	30.3	12.6	-	No data	No data	-
25/11/17	32.8	15	-	No data	No data	-
26/11/17	33.4	17.9	-	32.3	No data	-
27/11/17	25.7	19.6	0.2	No data	8.9	-
28/11/17	31.5	14.7	-	31.6	12.6	-
29/11/17	28.8	19	11.4	No data	17.5	-
30/11/17	29.1	20.1	0.2	No data	No data	-
01/12/17	32.3	18	-	No data	No data	-

APPENDIX H:
REVISION OF THE TARRAWONGA BIODIVERSITY OFFSET STRATEGY (AMBS 2024A)

Revision of the Tarrawonga Biodiversity Offset Strategy

Prepared by AMBS Ecology & Heritage Pty Ltd
for Whitehaven Coal Limited

Final Report

August 2024

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Executive Summary

AMBS Ecology & Heritage Pty Ltd (AMBS) were commissioned by Whitehaven Coal Limited (WHC) to prepare a revision to the Biodiversity Offset Strategy (RBOS) for the Tarrawonga Coal Mine (TCM). The Mine was approved in 2013 under NSW Project Approval 11_0047 which outlined a biodiversity offset strategy (Schedule 3 Condition 40) to offset impacts to biodiversity.

Since the approval of the original BOS in 2013; the process to establish in perpetuity security of offset areas using Conservation Agreements (CA) changed due to the implementation of the NSW Biodiversity Conservation Act 2016 (BC Act) and the subsequent establishment of the Biodiversity Conservation Trust (BCT). The BCT now oversees the preparation of CAs for the securing of offset areas.

To prepare for and achieve registration on title in June 2021 for the Willeroi Conservation Agreement (CA0060), the BCT required WHC to undertake detailed cadastral surveys and utilise contemporary vegetation mapping for the Willeroi CA0060. The Willeroi CA includes the Willeroi West offset area for TCM and the Willeroi East offset area for the Vickery Coal Mine (VCM).

The cadastral survey was undertaken by registered surveyors and involved redefining the cadastral boundary to a very high accuracy, resulting in variations to the previous extent of the offset area when compared to the lower accuracy, digital cadastre spatial data, that was used when mapping the original offset area. In addition, the BCT required the use of the NSW Plant Community Type (PCT) vegetation mapping classification system. As a result, the original TCM BOS vegetation mapping (undertaken by FloraSearch [2011] using an older classification system) needed to be revised utilising quantitative biometrics to define vegetation assemblages for the application of the required PCT mapping.

The TCM is also subject to the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) Approval 2011/5923. Condition 6 of this approval requires specified areas of equivalent or better quality habitat for the Regent Honeyeater (*Anthochaera phrygia*), Swift Parrot (*Lathamus* discolor), Greater Long-eared Bat (*Nyctophilus corbeni* and for the White Box Yellow Box Blakely's Reg Gum Grassy Woodland and Derived Native Grassland ecological community to be set aside as offsets.

This RBOS outlines how Willeroi West provides equivalent or improved biodiversity outcomes to the original BOS requirements from NSW Approval 11_0047 and equivalent or greater areas of habitat for the Regent Honeyeater Swift Parrot, Corben's Long-eared Bat and for the White Box Yellow Box Blakely's Red Gum Grassy Woodland and Derived Native Grassland ecological community to meet Commonwealth requirements in EPBC Act Approval 2011/5923 (Condition 6).

A comparison between the BOS and the RBOS shows variation between the vegetation types mapped. While there is variation; overall the RBOS meets the biodiversity value requirements as per the TCM Approvals (NSW 11_0047 & EPBC Act 2011/5923) relating to Threatened Ecological Communities (TECs) and threatened fauna habitat, and the extent of offset area and area required for "enhanced, and additional native vegetation to be established with the restoration" (i.e. revegetation and habitat augmentation). The RBOS will result in an increase in the area of TECs within the offset area (Table 5.1) of 49.8 ha. There will be no change to the status of the threatened plants recorded on the Willeroi West property as a result of the TCM RBOS. The habitat areas identified contain 1,385.67 ha of potential Regent Honeyeater (*Anthochaera phrygia*) habitat (greater than the minimum 1,055 ha) and 1,335.32 ha of potential Swift Parrot (*Phascolarctos cinereus*) habitat (greater than the minimum 397 ha), and 1,356.90 ha of potential Corben's Long-eared Bat habitat (greater than the minimum 1,355 ha) as required

under Condition 6 of the EPBC Act Approval 2011/5923. This RBOS does not alter or vary existing BOS commitments as described in NSW Approval 11_0047 and Commonwealth Approval 2011/5923. All commitments are maintained or exceeded as detailed in the following table.

Summary of requirements of NSW Project Approval 11_0047 and EPBC Approval 2011/5923 and how they have been met

Biodiversity Offset Strategy Criteria (PA11_0047 and/or EPBC 2011/5923)	Required Quantum for Biodiversity Offset Strategy (ha)	Quantum in Revised Biodiversity Offset Strategy (ha)	Difference (Revised BOS – Required BOS) (ha)
Minimum Area	1,660	1,660.03*	+0.03
Area of Box Gum Woodland CEEC (2011/5923)	232	281.80	+49.8
Box Gum Woodland CEEC (11_0047)	193	281.80	+88.8
Potential Regent Honeyeater Habitat (2011/5923)	1055	1385.67	+330.67
Potential Swift Parrot (2011/5923) Habitat	397	1,335.32	+938.32
Potential Habitat Corben's Long-eared Bat (2011/5923)	1355	1356.90	+1.9

* includes 14 dams and associated infrastructure (3.88 ha)

This RBOS does not alter or vary the commitment as described in the original BOS (NSW Approval 11_0047 Condition 40) for a Rehabilitation Area of 752 ha as part of the Offset package. This RBOS only addresses the external land based components of the TCM RBOS; and as such the description and implementation of the Rehabilitation Area offset will be documented in the future TCM Rehabilitation Management Plan (currently Whitehaven 2022a).

This document was submitted for review to the North West - Biodiversity, Conservation & Science, Department of Climate Change, Energy, the Environment and Water who found that the changes document in this RBOS are consistent with the requirements of development consent MP11_0047 and the Commonwealth approval 2011/5923 (Appendix A).

Contents

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Figures

1 Introduction

1.1 Background

AMBS Ecology & Heritage Pty Ltd (AMBS) were commissioned by Whitehaven Coal Limited (WHC) to prepare a revision to the Biodiversity Offset Strategy (RBOS) for the Tarrawonga Coal Mine (TCM). The Mine was approved in 2013 under NSW Approval 11_0047 which outlined a biodiversity offset strategy (Schedule 3 Condition 40) to offset impacts to biodiversity.

Since the approval of the original BOS in 2013; the process to establish in perpetuity security of offset areas using Conservation Agreements (CA) changed due to the implementation of the NSW Biodiversity Conservation Act 2016 (BC Act) and the subsequent establishment of the Biodiversity Conservation Trust (BCT). The BCT now oversees the preparation of CAs for the securing of offset areas.

To prepare for and achieve registration on title in June 2021 for the Willeroi Conservation Agreement (CA0060), the BCT required WHC to undertake detailed cadastral surveys and utilise contemporary vegetation mapping for the Willeroi CA0060. The Willeroi CA includes the Willeroi West offset area for TCM and the Willeroi East offset area for the Vickery Coal Mine (VCM).

The cadastral survey was undertaken by registered surveyors and involved redefining the cadastral boundary to a very high accuracy, resulting in variations to the previous extent of the offset area when compared to the lower accuracy, digital cadastre spatial data, that was used when mapping the original offset area. In addition, the BCT required the use of the NSW Plant Community Type (PCT) vegetation mapping classification system. As a result, the original TCM BOS vegetation mapping (undertaken by FloraSearch [2011] using an older classification system) needed to be revised utilising quantitative biometrics to define vegetation assemblages for the application of the required PCT mapping.

The TCM is also subject to the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) Approval 2011/5923. Condition 6 of this approval requires specified areas of equivalent or better-quality habitat for the Regent Honeyeater (*Anthochaera phrygia*), Swift Parrot (*Lathamus discolor*), Greater Long-eared Bat (*Nyctophilus corbeni*) and for the White Box Yellow Box Blakely's Red Gum Grassy Woodland and Derived Native Grassland ecological community to be set aside as offsets. This requirement to set aside habitat will be met within the Willeroi West offset property and is addressed in this RBOS. The Greater Long-eared Bat was listed as Vulnerable under the EPBC Act under the scientific name *Nyctophilus timoriensis* (south-eastern form). Subsequent taxonomic revision resulted in the south-eastern form being renamed as Corben's Long-eared Bat (*Nyctophilus corbeni*). For the purposes of this document, the common name "Corben's Long-eared Bat" will be utilised instead of Greater Long-eared Bat, in accordance with the species listing.

1.2 Relevant approval conditions relating to this revised BOS

1.2.1 NSW approval for the Tarrawonga Coal Mine (Project Approval 11_0047, Condition 40)

TCM was approved in 2013 (currently PA 11_0047 MOD9, DPIE 2021) and requires the implementation of the BOS shown in Table 1.1.

Table 1.1 Summary of the biodiversity offset strategy (Project Approval 11_0047)

Area	Offset Type	Minimum Size (hectares)
Willeroi West Offset	Existing native vegetation to be enhanced, and additional native vegetation to be established with the restoration of at least 193 ha of Box Gum Woodland EEC, as listed under BC Act	1,660
Rehabilitation Area	Native woodland vegetation communities to be re-established, focused on Box Gum Woodland EEC	752

Note: For the purposes of this approval Box Gum Woodland refers to the EEC listed as White Box Yellow Box Blakely's Red Gum Woodland under the BC Act, and the CEEC listed as White Box Yellow Box Blakely's Red Gum Grassy Woodland and Derived Native Grasslands under the EPBC Act, or similar EEC as may be updated from time to time.

1.2.2 Commonwealth approval for the Tarrawonga Coal Mine (EPBC Act Approval 2011/5923, Condition 6)

The TCM is subject to an approval granted under the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act). Condition 6 of the approval (currently EPBC Approval 2011/5923 variation dated 24 March 2021) specifies that the following areas of equivalent or better quality habitat must be offset (Table 1.2). An independent review (Eco Logical Australia, 2013) was submitted to the Commonwealth demonstrating that the required minimum extent of potential habitat was being met within the Willeroi West offset property.

Table 1.2 Offset Requirements for EPBC Act Approval 2011/5923

Threatened Entity	Scientific Name	Area (ha)
Regent Honeyeater	*Anthochaera phrygia*	1,055
Swift Parrot	*Lathamus discolor*	397
Corben's Long-eared Bat	*Nyctophilus corbeni*	1,355
White Box Yellow Box Blakely's Reg Gum Grassy Woodland and Derived Native Grassland ecological community	N/A	232

1.3 Scope and objectives

The scope of this project is to prepare a revised BOS that updates the original BOS and its required biodiversity values, first described in NSW Project Approval 11_0047 and to address threatened fauna habitat and CEEC requirements under EPBC Approval 2011/5932 for the Tarrawonga Coal Mine.

The objectives are to:

- describe the NSW BOS requirements and associated offset areas;
- describe the proposed revisions to the NSW BOS;
- describe the way in which the Commonwealth offset requirements for threatened entities will be met; and
- describe how these NSW and Commonwealth offset biodiversity value requirements will be met by the RBOS.

This RBOS outlines how Willeroi West provides equivalent or improved biodiversity outcomes to the original BOS requirements from NSW Project Approval 11_0047 and equivalent or greater

areas of habitat for the Regent Honeyeater Swift Parrot, Corben's Long-eared Bat and for the White Box Yellow Box Blakely's Reg Gum Grassy Woodland and Derived Native Grassland ecological community to meet Commonwealth requirements in EPBC Act Approval 2011/5923 (Condition 6).

1.4 Rehabilitation area as part of the approved BOS

This RBOS does not alter or vary the commitment as described in the original BOS (NSW Approval 11_0047 Condition 40) for a Rehabilitation Area as part of the Offset package. This RBOS only addresses the external land based components of the Tarrawonga BOS; and as such the description and implementation of the Rehabilitation Area offset (752 ha of native woodland vegetation communities to be re-established, focused on Box Gum Woodland EEC) is documented in the future TCM Rehabilitation Management Plan (currently Whitehaven 2022a).

1.5 Location of the study area

The study area is located on the north western slopes of New South Wales; 49.1km west of Barraba (Figure 1.1). The study area falls within the Narrabri Shire local government area in the Nandewar IBRA region and Peel subregion. Figure 1.2 shows the original boundary of the Willeroi West offset property and the revised boundary.

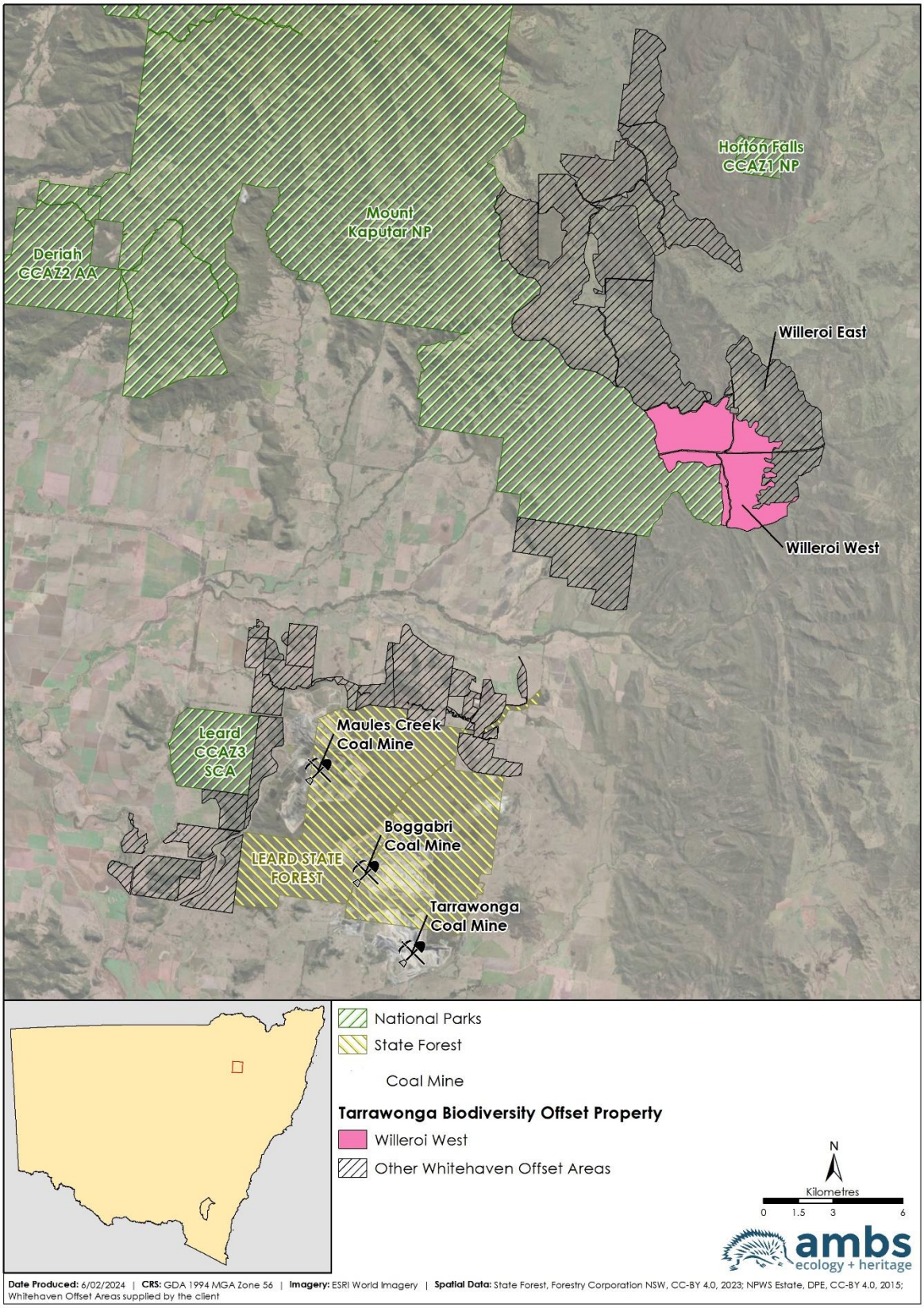


Figure 1.1 Location of the study area

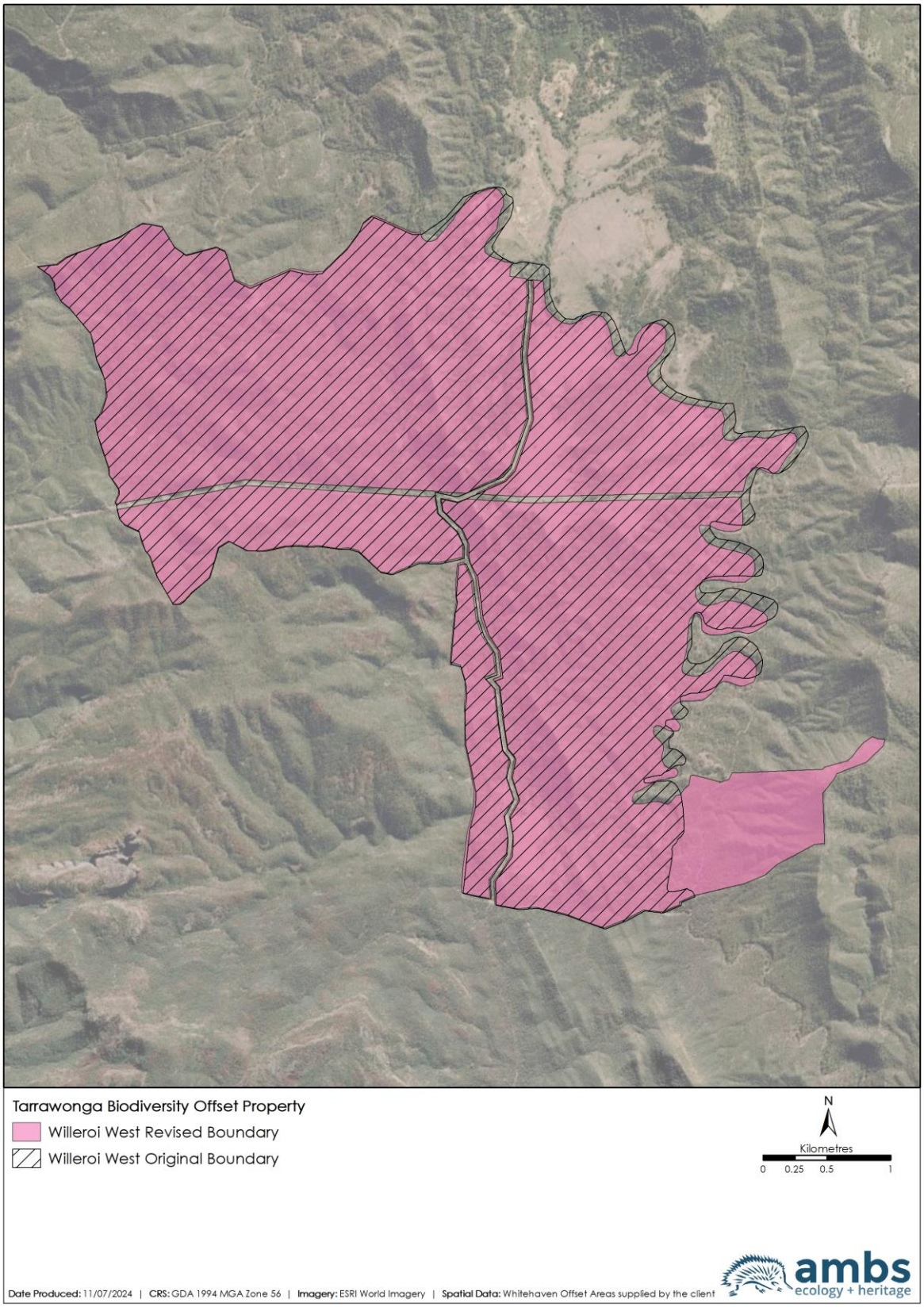


Figure 1.2 Change to the boundary of the Tarrawonga Biodiversity Offset Property

2 Overview of original offset area

The extent of the Willeroi West Offset Property as described in the NSW Project Approval 11_0047 is shown in Figure 2.1. An assessment of this property was undertaken in 2011 as part of the EIS for the TCM (FloraSearch 2011). An independent review of the Willeroi West offset property was undertaken by Eco Logical (2013). The property is owned by Whitehaven Coal Mining Limited. Willeroi West is situated in the Gunnedah Basin, within the Maules Creek sub-catchment of the Namoi River and within the Nandewar IBRA bioregion, and the Peel IBRA subregion.

The topography of the study area is generally rugged to the west where it adjoins Mount Kaputar National Park (Figure 1.1) and flattens out towards Maules Creek to the east which follows a large part of the western boundary. Altitudes in the study area range from 400 metres (m) Australian Height Datum (AHD) in the south-eastern portion to 1,020 m AHD in the western portion. The flatter areas of the property are predominantly cleared with mature native trees and shrubs occupying watercourses and steeper slopes.

The study area was originally described as being 1,660 ha in area (EcoSearch 2011) and is part of a large expanse of connected vegetation, extending from approximately 25 km to the south-west, through to Mount Kaputar National Park to the immediate north-west. The main watercourse in the study area is Maules Creek, which occurs along the eastern border of the study area. Throughout the study area a number of drainage lines feed into Maules Creek; which in turn is a tributary of the Namoi River.

The extent of historical clearing on the Willeroi West property is limited to the central riparian and shallow slopes/flats adjacent to Maules Creek with majority of the property showing moderate to high flora and fauna diversity in the remnant to regenerating semi-cleared native vegetation on steeper slopes and escarpments.

2.1 Flora

The following information is taken from FloraSearch (2011) and Eco Logical (2013).

Flora survey was carried out over 12 days in the periods 25 to 29 May 2011 and 1, 4, 6, 8 to 11 August 2011. The survey encompassed all patches of native vegetation within the study area in order to sample and identify all communities present. Twenty five plots in native vegetation were sampled from across the study area to determine the vegetation types present. A series of Random Meander transects were used to search for threatened flora.

The vegetation within the study area was categorised into 8 vegetation types. Variants were recognised within several communities and represent condition classes reflecting past disturbance and the nature of the regeneration currently present (Figure 2.1).

Vegetation was assigned to Regional Biodiversity Vegetation Types (RBVT) by Eco Logical (2013) Table 2.1.

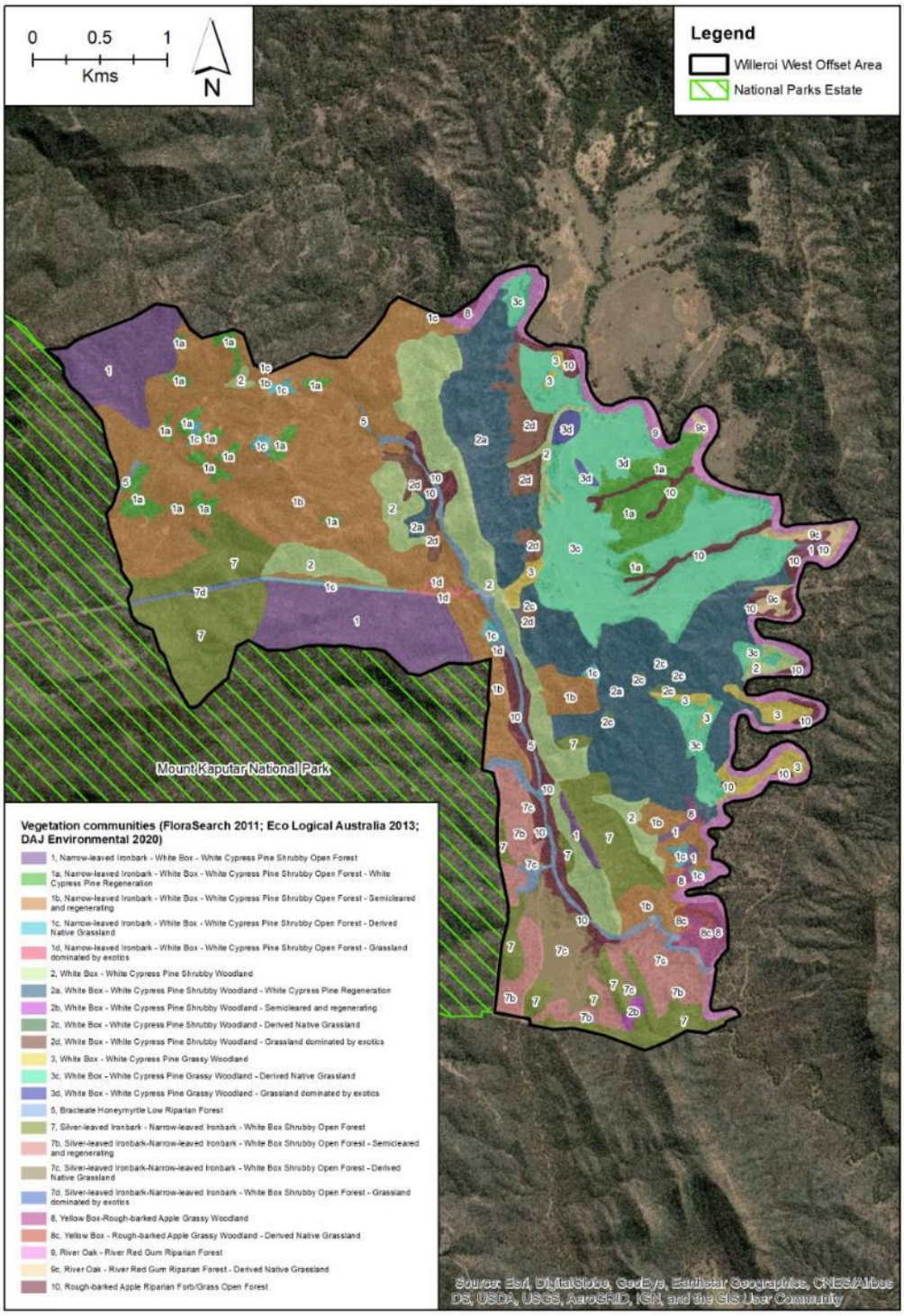


Figure 2.1 Extent of the Willeroi West offset area (Whitehaven 2022b)

Table 2.1 Vegetation community alignment and area for Willeroi West (EcoSearch 2011; Eco Logical 2013)

Vegetation Type (FloraSearch 2011)	Biometric Vegetation Type (Eco Logical 2013)	Condition	EEC	Area (ha)
5. Bracteate Honeymyrtle Low Riparian Forest	NA191 Bracteate Honey Myrtle riparian low forest/shrubland of rich soil depressions in the Brigalow Belt	Forest	-	27.23
1. Narrow-leaved Ironbark - White Box - White Cypress Pine Shrubby Open Forest	NA228 White Cypress Pine - Narrow-leaved Ironbark shrub/grass open forest of the western Nandewar Bioregion	Forest	-	127.82
1c. Narrow-leaved Ironbark - White Box - White Cypress Pine Shrubby Open Forest	NA228 White Cypress Pine - Narrow-leaved Ironbark shrub/grass open forest of the western Nandewar Bioregion	DNG	-	14.53
1d. Narrow-leaved Ironbark - White Box - White Cypress Pine Shrubby Open Forest	NA228 White Cypress Pine - Narrow-leaved Ironbark shrub/grass open forest of the western Nandewar Bioregion	Exotic grassland	-	2.44
1b. Narrow-leaved Ironbark - White Box - White Cypress Pine Shrubby Open Forest	NA228 White Cypress Pine - Narrow-leaved Ironbark shrub/grass open forest of the western Nandewar Bioregion	Semi cleared	-	357.28
1a. Narrow-leaved Ironbark - White Box - White Cypress Pine Shrubby Open Forest	NA228 White Cypress Pine - Narrow-leaved Ironbark shrub/grass open forest of the western Nandewar Bioregion	WCP Regen	-	67.43
9. River Oak - River Red Gum Riparian Forest	NA191 River Oak riparian woodland of the Brigalow Belt South and Nandewar Bioregions (Benson 84)	Forest	-	76.96
9. River Oak - River Red Gum Riparian Forest	NA191 River Oak riparian woodland of the Brigalow Belt South and Nandewar Bioregions (Benson 84)	DNG	-	11.50
10. Rough-barked Apple Riparian Forb/Grass Open Forest	NA197 Rough-barked Apple riparian forb/grass open forest of the Nandewar Bioregion	Forest	-	58.76
7. Silver-leaved Ironbark - Narrow-leaved Ironbark - White Box Shrubby Open Forest	NA232 White Cypress Pine - White Box - Silver-leaved Ironbark shrubby open forest of the Nandewar Bioregion	Forest	-	157.14
7. Silver-leaved Ironbark - Narrow-leaved Ironbark - White Box Shrubby Open Forest	NA232 White Cypress Pine - White Box - Silver-leaved Ironbark shrubby open forest of the Nandewar Bioregion	DNG	-	33.58
7. Silver-leaved Ironbark - Narrow-leaved Ironbark - White Box Shrubby Open Forest	NA232 White Cypress Pine - White Box - Silver-leaved Ironbark shrubby open forest of the Nandewar Bioregion	Exotic grassland	-	3.01
7. Silver-leaved Ironbark - Narrow-leaved Ironbark - White Box Shrubby Open Forest	NA232 White Cypress Pine - White Box - Silver-leaved Ironbark shrubby open forest of the Nandewar Bioregion	Semi cleared	-	67.39
3.White Box - White Cypress Pine Grassy Woodland	NA226 White Box grassy woodland of the Nandewar and Brigalow Belt South Bioregions	Woodland	CEEC	22.89
3c. White Box - White Cypress Pine Grassy Woodland	NA226 White Box grassy woodland of the Nandewar and Brigalow Belt South Bioregions	DNG	CEEC	192.80
3d. White Box - White Cypress Pine Grassy Woodland	NA226 White Box grassy woodland of the Nandewar and Brigalow Belt South Bioregions	Exotic grassland	CEEC	5.73

Vegetation Type (FloraSearch 2011)	Biometric Vegetation Type (Eco Logical 2013)	Condition	EEC	Area (ha)
2. White Box - White Cypress Pine Shrubby Woodland	NA225 White Box White Cypress Pine shrubby open forest of the Nandewar and Brigalow Belt south bioregions	Woodland	-	140.84
2c. White Box - White Cypress Pine Shrubby Woodland	NA225 White Box White Cypress Pine shrubby open forest of the Nandewar and Brigalow Belt south bioregions	DNG	-	4.66
2d. White Box - White Cypress Pine Shrubby Woodland	NA225 White Box White Cypress Pine shrubby open forest of the Nandewar and Brigalow Belt south bioregions	Exotic grassland	-	33.07
2b. White Box - White Cypress Pine Shrubby Woodland	NA225 White Box White Cypress Pine shrubby open forest of the Nandewar and Brigalow Belt south bioregions	Semi cleared	-	2.50
2a. White Box - White Cypress Pine Shrubby Woodland	NA225 White Box White Cypress Pine shrubby open forest of the Nandewar and Brigalow Belt south bioregions	WCP Regen	-	233.11
8. Yellow Box - Rough-barked Apple Grassy Woodland	NA237 Yellow Box - Blakely's Red Gum grassy woodland of the Nandewar Bioregion	DNG	CEEC	2.40
8. Yellow Box - Rough-barked Apple Grassy Woodland	NA237 Yellow Box - Blakely's Red Gum grassy woodland of the Nandewar Bioregion	Woodland	CEEC	14.45
Total (including exotic grassland)				**1,657.52**
Total Excluding Exotic Grassland				**1,613.27**

2.2 Threatened Ecological Communities

The following Threatened Ecological Communities (TECs) as listed under the NSW Biodiversity Conservation Act (BC Act) and/or Environment Protection and Biodiversity Conservation Act, 1999 (EPBC Act) were detected within the study area.

- Yellow Box - Blakely's Red Gum Derived Native Pasture is equivalent to White Box Yellow Box Blakely's Red Gum Woodland listed as Critically Endangered under the BC and EPBC Acts.

Communities 3 and 8 were identified as part of the Box - Gum Woodland EEC (TSC Act) and the Box - Gum Grassy Woodland and Derived Grassland CEEC (EPBC Act) (FloraSearch 2011). The community occupy generally low positions in the landscape along and west of Maules Creek and have generally low gradients and predominantly grassy understoreys (FloraSearch 2011).

The areas of this TEC are given in Table 2.2 and the location is shown on Figure 2.2. The independent review by EcoLogical (2013) determined that 238 ha of the Box Gum Grassy Woodland TEC was present on Willeroi West.

Table 2.2 Threatened Ecological Communities recorded in the Willeroi West offset area (EcoSearch 2011)

Vegetation Community Number	Community Name	Area (ha)
3	White Box - White Cypress Pine Grassy Woodland	23
8	Yellow Box – Rough Barked Apple Grassy Woodland	14
3c	Derived Native Grassland	193
8c	Derived Native Grassland	2
Total Box-Gum Woodland CEEC		**232**

2.3 Threatened plants

No threatened plants listed in the schedules of the TSC Act or EPBC Act, were recorded on the Willeroi West Offset property.

2.4 Fauna

Baseline fauna surveys were undertaken in August 2011 by Cenwest Environmental Service. Six broad fauna habitat types were identified in the study area. These included Dry Sclerophyll Forest, Dry Sclerophyll Forest – Cypress Pine Monoculture Regrowth, Grassy Woodland, Riparian/Floodplain, Grassland (native), Farm Dams and Grassland (introduced).

Cenwest Environmental Service (2011) recorded 15 threatened fauna species listed under the TSC Act. These comprise eight birds, six mammals and one reptile:

- Turquoise Parrot (*Neophema pulchella*);
- Brown Treecreeper (eastern subspecies) (*Climacteris picumnis*);
- Diamond Firetail (*Stagonopleura guttata*);
- Black-chinned Honeyeater (*Melithreptus gularis*);
- Hooded Robin (*Melanodryas cucullata cucullata*);
- Grey-crowned Babbler (*Pomatostomus temporalis*);
- Varied Sittella (*Daphoenositta chrysoptera*);
- Little Lorikeet (*Glossopsitta pusilla*);
- Squirrel Glider (*Petaurus norfolcensis*);
- Eastern False Pipistrelle (*Falsistrellus tasmaniensis*);
- Greater Broad-nosed Bat (*Scoteanax rueppellii*);
- Eastern Bentwing Bat (*Miniopterus oceanensis*);
- Eastern Cave Bat (*Vespadelus troughtoni*);
- Eastern Freetail-bat (*Mormopterus norfolkensis*); and
- Border Thick-tailed Gecko (*Underwoodisaurus sphyrus*).

One threatened fauna species that was recorded in the proposed offset area is also listed under the EPBC Act, namely, the Border Thick-tailed Gecko.

Eco Logical (2013) confirmed that Willeroi West would provide the required number of hectares of habitat for three threatened fauna species (Table 2.3).

Table 2.3 Areas of habitat mapped in the original Willeroi West assessment for threatened fauna considered in Commonwealth Approval 2011/5923

Common Name	Habitat	Area (ha)
Regent Honeyeater	Foraging	1053.29
Swift Parrot	Foraging	890.33
Greater Long-eared Bat	Breeding/Foraging	1353.83

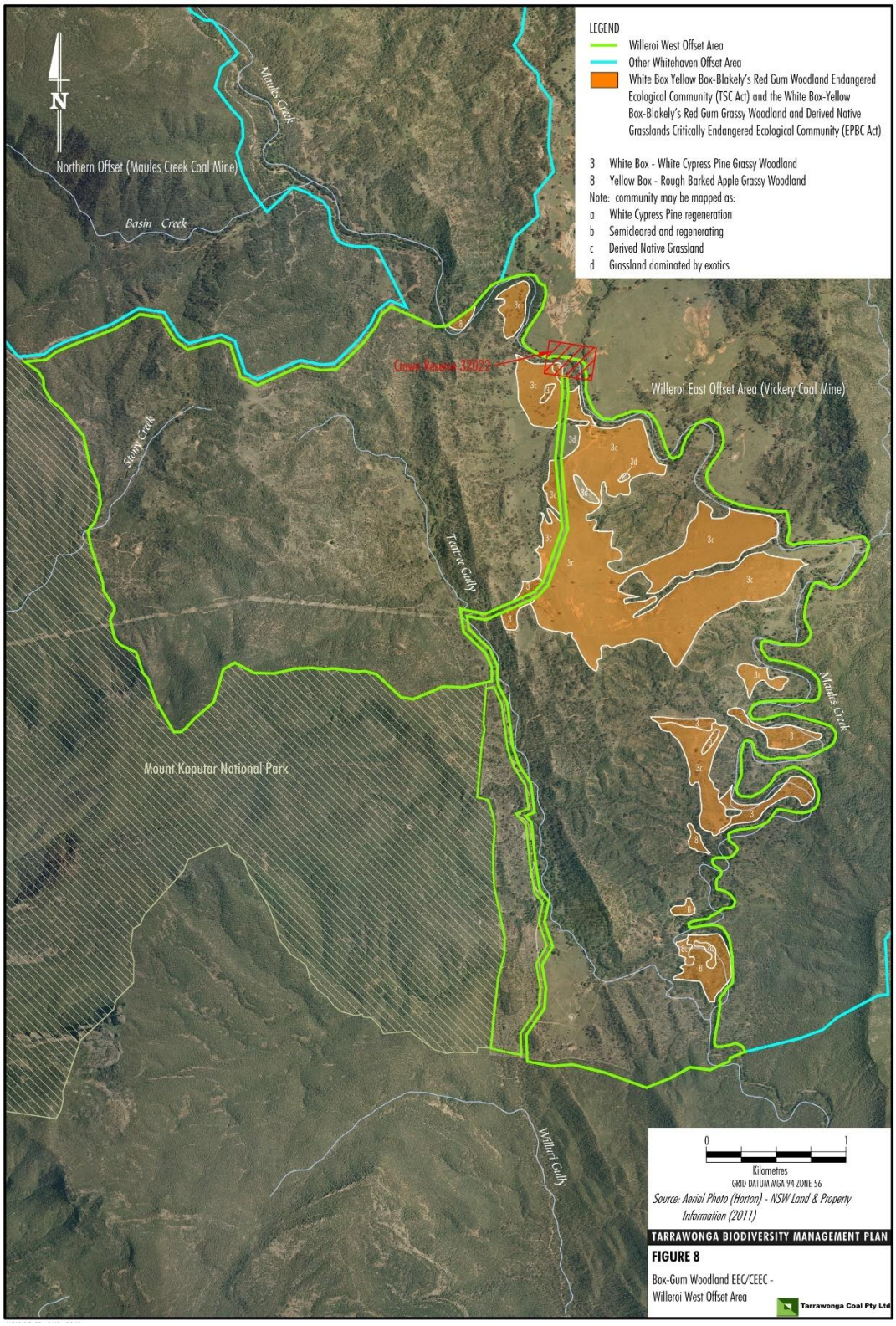


Figure 2.2 Original mapping of Threatened Ecological Communities in Willeroi West offset (Whitehaven 2015)

3 Methods

3.1 Flora

3.1.1 Desktop and literature review

The Border Rivers Gwydir / Namoi Region Version 2.0 VIS ID 4467, State Vegetation Type Map was reviewed to identify broad target areas for field vegetation surveys and potential Plant Communities. Previous mapping undertaken within the property by EcoSearch (2011) and AMBS was also reviewed to inform the selection of survey locations and candidate PCTs.

3.1.2 Field surveys

Preliminary field surveys were undertaken across the offset area by AMBS in 2019. Comprehensive data collection for determining PCTs and Threatened Ecological Communities (TECs) were completed in February and March 2022. Surveys included vegetation mapping and BAM floristic plots and rapid data points (RDPs) for confirmation of PCT selection and boundaries. Vegetation community boundaries were assigned on the basis of data and observations collected in the field and aerial photograph interpretation. RDPs involved collecting waypoints using a combination of the following devices and software: the Handy GPS mobile device application; the Fulcrum mobile device application; and a handheld Garmin GPS unit. Dominant species, soil type, structure and condition were recorded.

Areas with the potential to fit the criteria for the Box-Gum Woodland CEEC were sampled with full floristic plots and rapid data points. These data were used to assess patches against the criteria in the Box-Gum Woodland CEEC Listing Advice (TSSC 2006).

The experience and qualifications of the ecologists involved in the collection of the flora field data are provided in Table 3.1.

A total of 21 Full Floristic, 51 Rapids, 15 TEC plots and 13 TEC Rapid Plots were undertaken across two adjoining properties, Willeroi West and Willeroi East (offset for the Vickery Coal Mine). The location of these plots is shown on Figure 3.2.

For Willeroi West, a total of 10 full floristic, 26 rapid plots, 6 TEC plots and 4 TEC Rapid plots were undertaken over a number of survey periods, starting from 14 December 2020, 8-10 and 22-25 February 2022 as well as 4 and 9-11 March 2022.

Table 3.1 Qualifications of ecologists undertaking vegetation surveys

Name	Qualifications	Experience
Belinda Pellow	Diploma in Applied Science (Agriculture)	40 years'
	Associate Diploma in Arts (Aboriginal Studies)	
	Certified Practicing Ecological Consultant (ECA NSW No:3)	
Tom O'Sullivan	Master of Environmental Mgt (incomplete) - Macquarie University	25 years'
	Undergraduate Degree (majors: Zoology / Physical Geography	
	Environmental Management Certificate – TAFE	
	Accredited BAM Assessor	
Mark Robinson	Associate Diploma in Horticulture	30 years'
	Graduate Diploma in Environment Management	

Name	Qualifications	Experience
	Master of Environment & Restoration	
James Schlunke	Bachelor of Science (Honours)	13 years'
	Doctor of Philosophy	
	BAM accredited Assessor	
Matt Saunders	Bachelor of Science	
	Master of Ecosystem Management and Conservation	5 years'
Corey O'Brien	Bachelor of Science (Advanced; General Biology)	4 years'
	Master of Research	
	Certificate IV in Spatial Information Service	
Gabriella Hoban	Bachelor of Environmental Management (Ecology)	5 years'
Manuel Lequerica Tamara	Bachelor of Science (Ecology)	10 years'
	Master of Agriculture (Environmental Economics)	
	Master of Science (Urban Ecology)	
	Doctor of Philosophy	

3.1.3 PCT determination and mapping

PCT determination and mapping was undertaken across two adjoining properties, Willeroi East and Willeroi West (offset for the Tarrawonga Mine) to maximise the effectiveness of the data analyses and interpretation. The methods used for systematic survey, classification and mapping of vegetation in the Willeroi West offset area, conform with NSW standards (see Appendix 5 of the Native Vegetation Interim Type Standards; Sivertsen 2009). Data analyses and interpretation, determination of PCTs and PCT mapping were undertaken by Belinda Pellow and Corey O'Brien. Floristic data from 36 plots was used in quantitative analyses to identify vegetation groups which were subsequently assigned to PCTs (DPIE 2023c). Data collected in areas of native vegetation determined to be of Good or Moderate condition were included in the floristic analysis. Records of percent cover and abundance estimates were transformed to a modified Braun-Blanquet 1-6 cover score (Braun-Blanquet 1932). Floristic data were edited to remove non-native species, native species not recorded to at least the species level, and species recorded in a single plot. Scientific names of all floristic records were updated in accordance with the Bionet Species Names database (NSW DPIE 2022b) and where flora identified to subspecies level, the record was reverted to species level to ensure consistency across plots.

Agglomerative hierarchical clustering using UPGMA (Unweighted Pair-Group Method using Arithmetic averages) was undertaken using the *vegan* R package (Oksaren et al. 2022; R Core Team 2021) based on Bray-Curtis dissimilarity distance measures between sites. Optimum groupings of sites were initially determined by assessing within cluster sums of squares, average silhouette widths and gap statistic methods from the *factoextra* R package (Kassambara & Mundt 2020). The resulting groups were visualised spatially in GIS software alongside topographic data and opportunistic floristic data records to assign groups to PCT based on floristic composition and position in the landscape. Where appropriate, sites were reassigned to different PCTs than what was determined by original grouping with consideration of landscape position, dominant flora species, and the presence of canopy species recorded in surrounding area not captured within the 20 m x 20 m plot.

A Multi-level Pattern Analysis was conducted using the *indicspecies* R package (Caceres & Legendre 2009) on final site groupings to identify indicator species for single groups and combinations of

groups. Pairwise comparisons of species contributions to group formation were conducted via SIMPER analysis using the *vegan* R package (Oksaren et al. 2022).

Plant Community Types (PCTs) were assigned using published descriptions, benchmark condition and associated data included in the *BioNet Vegetation Classification Database* (DPIE 2023c). PCTs were primarily compared based on characteristic species in vegetation assemblages in addition to abiotic variables of the associated plot locations including geology, topography and soils if required.

PCT selection in this region is difficult as there can be discrepancy between actual species composition and the species assemblages in the PCT description (DPIE 2023c). Where discrepancies occur a "best fit" approach has been used to assign a PCT. Where zones have been cleared designation of PCT is constrained by the lack of structural features in particular representative canopy trees. In these situations, a number of other features are used to help delineate boundaries this includes observations of the vegetation immediately adjacent to the zone, location in the landscape and contour lines. If appropriate, soils are also considered although this feature is not definitive in relation to the species assemblages present.

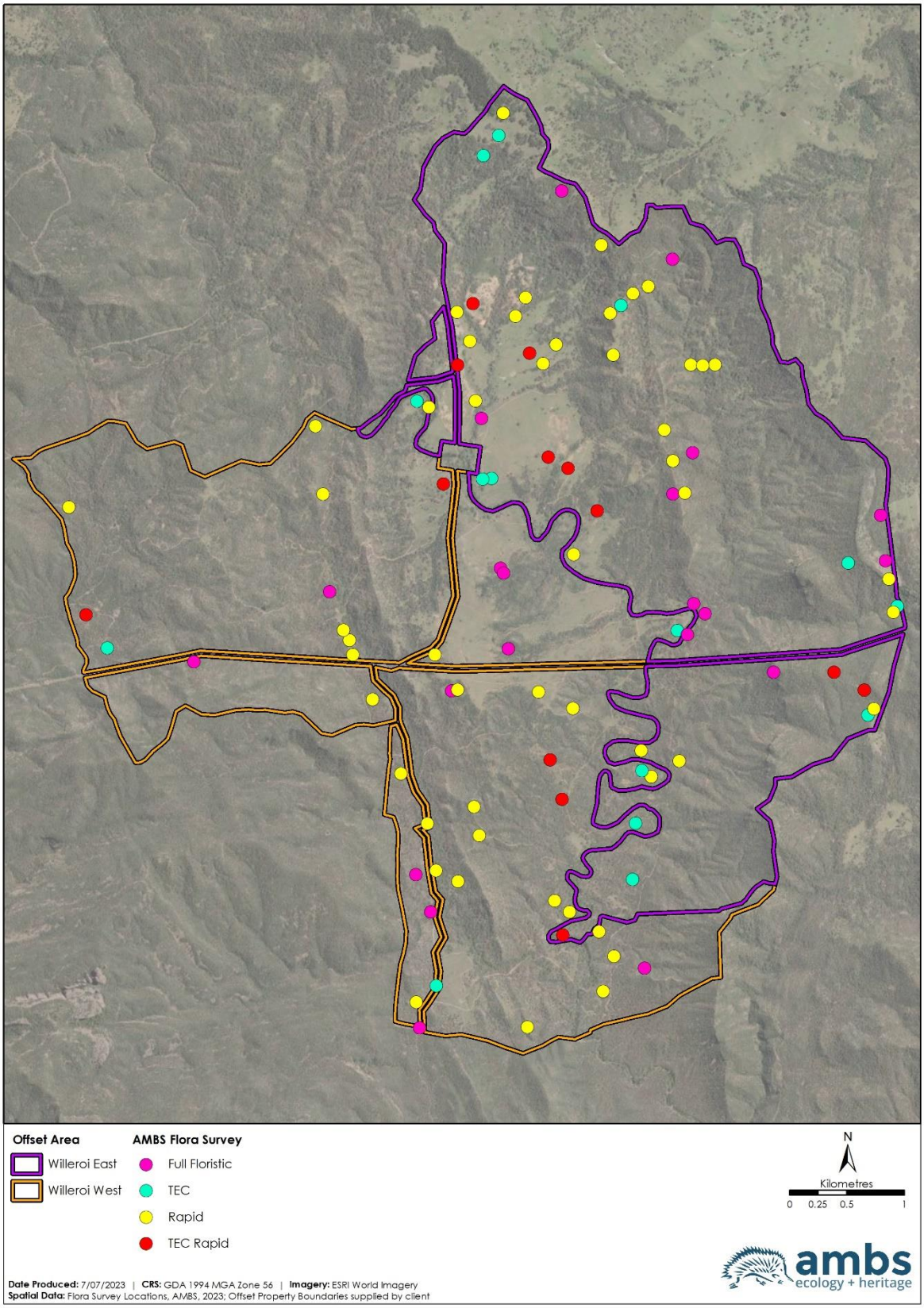


Table 3.2 Location of vegetation mapping plots on the Willeroi property (East and West)

3.2 Fauna

3.2.1 Desktop and literature review

A review of available reports and threatened fauna records from databases was used to assess the fauna values for the RBOS.

The following reports and databases were reviewed for the purposes of understanding fauna diversity, abundance and habitat preferences for the offset properties in the revised RBOS:

- Cenwest Environmental Services (2011) Willeroi Fauna Survey Report;
- AMBS Ecology and Heritage (2018) Fauna Monitoring of the Maules Creek and Tarrawonga Mine Offset Areas – Spring 2017;
- AMBS Ecology and Heritage (2019a) Fauna Monitoring of the Maules Creek and Tarrawonga Mine Biodiversity Offset Areas – Spring 2018;
- AMBS Ecology & Heritage (2019b) Bird Surveys in Whitehaven Offset Areas – Winter 2018;
- AMBS Ecology and Heritage (2020a) - Fauna Monitoring of the Maules Creek and Tarrawonga Mine Biodiversity Offset Areas – Spring 2019;
- AMBS Ecology & Heritage (2020b) - Bird Surveys in Whitehaven Offset Areas – Winter 2019 - Consultancy report to Whitehaven Coal Limited;
- AMBS Ecology & Heritage (2020c) 5 – Year Review of the Annual Fauna Monitoring Program Data for the Maules Creek and Tarrawonga Biodiversity Offsets.
- AMBS Ecology & Heritage (2023) Fauna Monitoring of the Whitehaven Coal Biodiversity Offset Properties June 2020 to July 2023;
- BioNet Atlas (DPE 2023a);
- Atlas of Living Australia Website (Atlas of Living Australia, 2024); and,
- Birdlife Australia Website (BirdLife Australia, 2024).

3.2.2 Categorising habitat value for Regent Honeyeater, Swift Parrot and Corben's Long-eared Bat

Defining and identifying potential habitat for the Regent Honeyeater, Swift Parrot and Corben's Long-eared Bat was undertaken in two steps. The first step was to interrogate the Threatened Biodiversity Data Collection (TBDC) (DPE 2023b) to inform baseline PCT mapping for each species. Once this was complete, the mapping was evaluated to determine if it was an accurate representation of habitat for each species based on the presence or absence of certain habitat features. For the Regent Honeyeater, important habitat features included the presence of key feed tree species (Mugga Ironbark, White Box, Yellow Box), key mistletoe species (Needle-leaf Mistletoe, Box Mistletoe and Drooping Mistletoe) and/or the presence of major drainage features lined with River Oak (*Casuarina cunninghamiana*). For the Swift Parrot, important habitat features included the presence of key winter flowering tree species (Mugga Ironbark, Red Ironbark, White Box, Yellow Box, River Red Gum) and species known to be used by Swift Parrot for lerping (Yellow Box, Bimble Box). Key habitat features for the Corben's Long-eared Bat, included old growth cypress with decorticating bark, trees with hollows, areas of dense shrub and the presence of records collected during harp trap survey programs. The decision to include or exclude each polygon was based on AMBS' six years of field observations on the Willeroi property (East and West), annual monitoring surveys on the properties (AMBS 2018, 2019a, 2020c, 2023b), target habitat assessments undertaken in 2019 (AMBS 2020c) and 2021 (AMBS 2021) and the reported ecology of each species.

From that process, a set of maps were produced that reflect the current habitat present for each species. After this process was undertaken, habitats were classified as either Existing Potential Habitat, Future Potential Habitat or not habitat. Both woodland and derived native grassland forms

of the relevant PCTs occur within the proposed offset properties. Areas of woodland considered suitable for each species was defined and mapped as "Existing Potential Habitat".

Areas of derived native grassland within the offset properties were identified as "Future Potential Habitat" because these areas are adjacent to Existing Potential Habitat and will be revegetated. Revegetation for these areas will provide foraging resources for each species as the revegetation develops and will improve landscape connectivity with areas of Existing Potential Habitat. There is no timeline proposed for when these areas of habitat will become suitable and these areas are not included in the assessment of area of habitat value for both species.

Unmapped areas correspond with PCTs that are not considered to be suitable for any of the three species. This mapping is conservative as in many cases, patchy foraging resources for are present (i.e. Box Mistletoe and Drooping Mistletoe are present for the Swift Parrot and Regent Honeyeater, shrubby foraging areas are present for the Corben's Long-eared Bat) and the areas are adjacent to PCTs mapped as Existing Potential Habitat.

The area values of Existing Potential Habitat were used to evaluate the habitat value provided by the proposed offset properties against the requirements defined in EPBC 2011/5923.

4 Results

4.1 Description of revised BOS values – Flora

Nine plant community types in a range of condition states were mapped across the Willeroi West offset area. The PCTs are listed in Table 4.1, shown in Figure 4.1 and described below.

Table 4.1 PCTs mapped within the Willeroi West property

Plant Community Type and Condition	Area (ha)
84: River Oak - Rough-barked Apple - red gum - box riparian tall woodland	35.14
112: Black Tea-tree - River Oak - Wilga riparian low forest/shrubland wetland	21.58
563: White Box - Silvertop Stringybark +/- White Cypress Pine grass shrub open forest	50.36
588: White Box - White Cypress Pine shrubby hills open forest	51.23
589: White Box - White Cypress Pine - Silver-leaved Ironbark grassy woodland	55.13
592: Narrow-leaved Ironbark - cypress pine - White Box shrubby open forest	479.75
592: Derived Native Grassland	6.93
594: Silver-leaved Ironbark - White Cypress Pine shrubby open forest	169.10
594: Derived Native Grassland	8.03
1308: White Box - White Cypress Pine shrubby open forest	472.60
1308: Derived Native Grassland	4.62
1383: White Box grassy woodland	72.37
1383: Derived Native Grassland	229.31
Total Native Vegetation	**1,656.15**
Not Native	3.88
Total	**1,660.03**

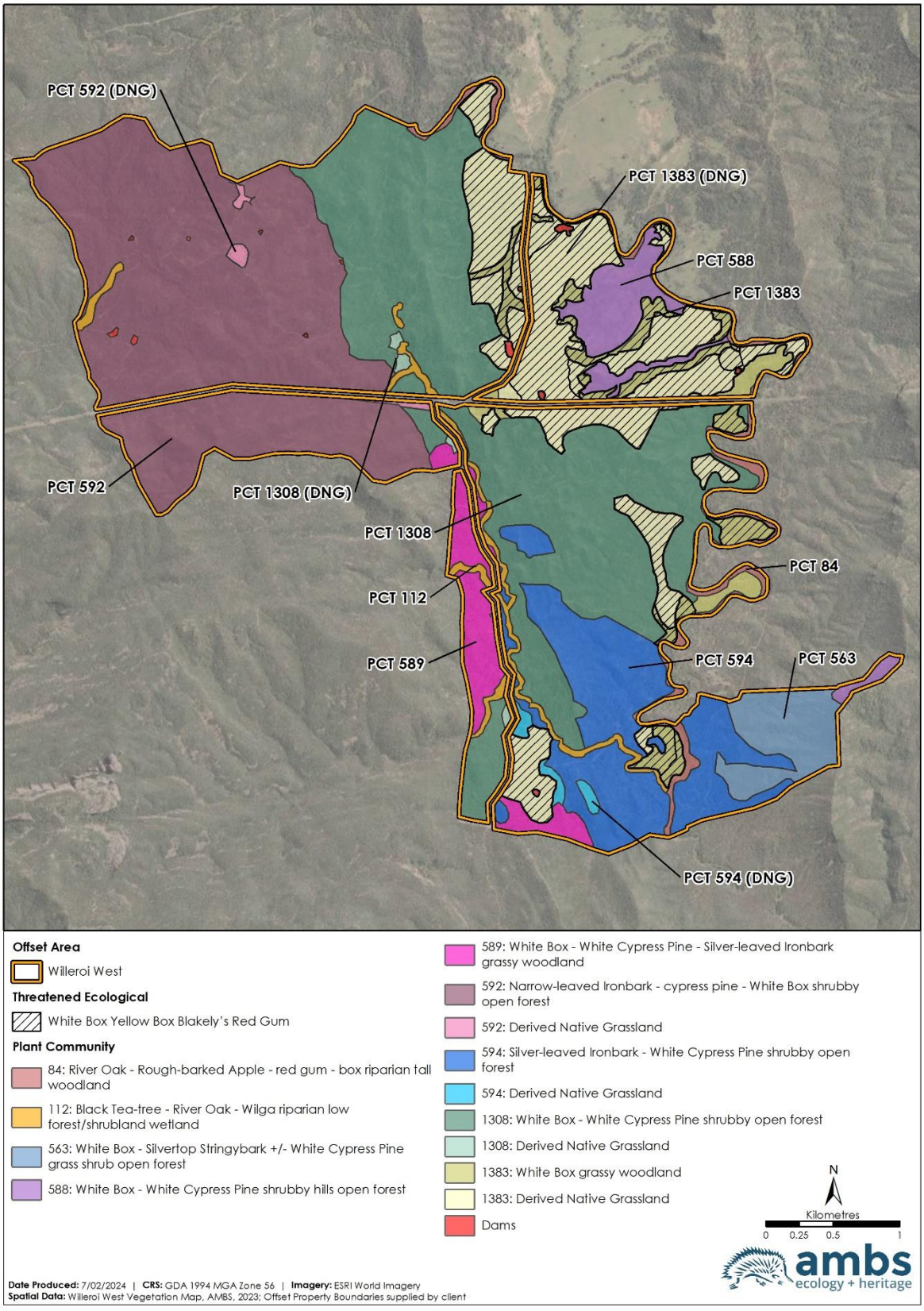
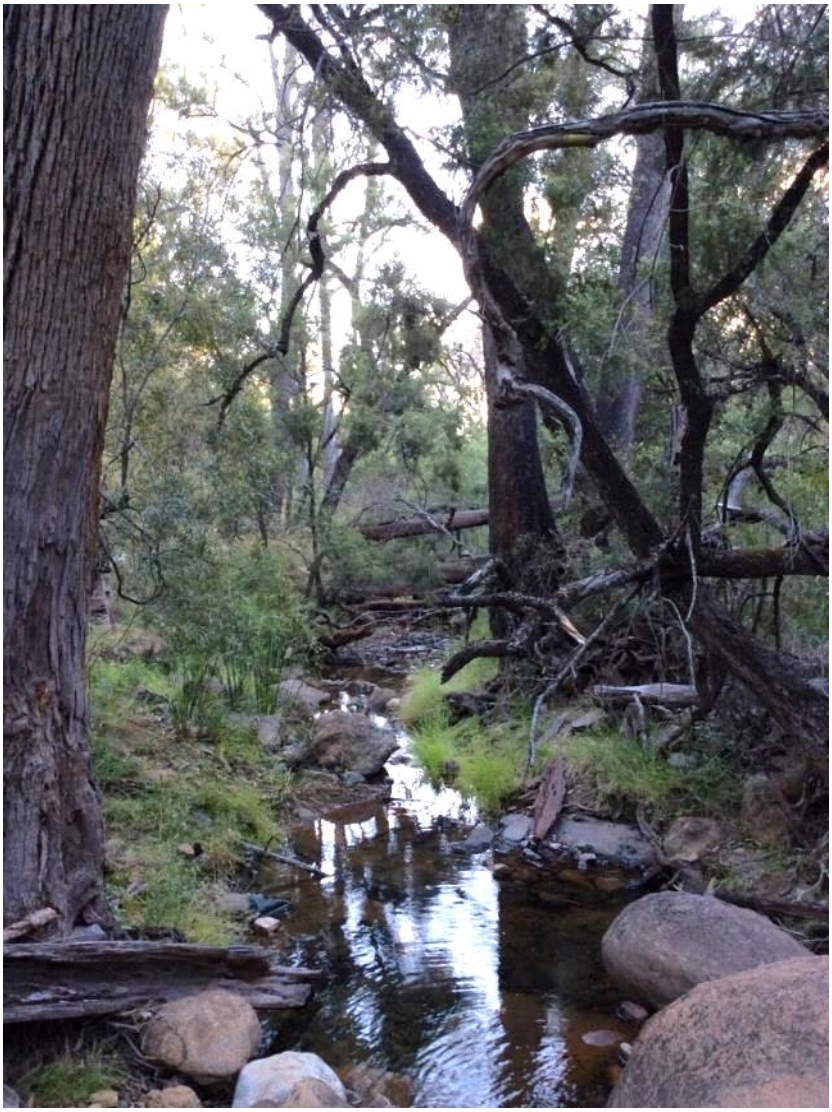


Figure 4.1 Plant Community Types and Threatened Ecological Communities in the Willeroi West offset property

4.1.1 Plant Community Type descriptions

PCT 84: River Oak - Rough-barked Apple - red gum - box riparian tall woodland



PCT Name: River Oak - Rough-barked Apple - red gum - box riparian tall woodland (wetland) of the Brigalow Belt South Bioregion and Nandewar Bioregion

Vegetation Class: Eastern Riverine Forests

EPBC Status: not listed

BC Status: not listed

Description on the Property

The canopy layer in this PCT is dominated by *Casuarina cunninghamiana* subsp*. cunninghamiana* (River Oak), *Angophora floribunda* (Rough-barked Apple), *Melaleuca bracteata* (Black Tea-tree), *Pandorea pandorana* (Wonga Wonga Vine).

The mid layer is dominated by *Notelaea microcarpa* (Native Olive), *Alectryon subdentatus f. subdentatus* and *Phyllanthus subcrenulatus* with Pandorea pandorana (Wonga Wonga Vine) and

Glycine latifolia. Other species in this layer include *Melaleuca bracteata* (Black Tea-tree), *Trema tomentosa* var*. aspera* (Native Peach), *Nyssanthes diffusa* (Barbwire Weed).

The ground layer contains grass species such as *Microlaena stipoides* var*. stipoides* (Weeping Grass), *Austrostipa verticillata* (Slender Bamboo Grass), *Oplismenus imbecillis*, *Austrostipa scabra* (Speargrass). Sedges and rushes include *Cyperus gracilis* (Slender Flat-sedge) and Lomandra longifolia (Spiny-headed Mat-rush).

Species such as *Adiantum aethiopicum* (Common Maidenhair), *Pandorea pandorana* (Wonga Wonga Vine), *Glycine latifolia, Commelina cyanea* (Native Wandering Jew), *Nyssanthes diffusa* (Barbwire Weed), *Sigesbeckia australiensis*, *Galium leptogonium* and *Urtica incisa* (Stinging Nettle), were also present in the ground layer of the plots.

BioNet Description

PCT 84 is typically a tall woodland or open forest to 30 m high dominated by *Casuarina cunninghamiana subsp. cunninghamiana* often with *Angophora floribunda, Eucalyptus camaldulensis, Eucalyptus melliodora, Eucalyptus blakelyi* and occasionally *Eucalyptus albens*. A sparse shrub layer may occur including *Acacia implexa,* various *Leptospermum spp., Dodonaea spp., Phyllanthus subcrenulatus, Bursaria spinosa, Callistemon spp., Olearia viscidula* and the vines such as *Pandorea pandorana, Clematis glycinoides, Parsonsia straminea* and *Stephania japonica*. In some places a dry rainforest lower tree/high shrub layer may occur that includes *Alphitonia excelsa, Alectryon spp., Ficus rubiginosa* and *Notelaea microcarpa*. The ground cover can be dense or sparse and contains a rich flora of small shrubs, grasses, sedges and forbs. Grasses include *Microlaena stipoides var. stipoides, Cynodon dactylon, Chloris virgata, Oplismenus imbecillis, Austrostipa verticillata, Lachnagrostis filiformis, Arundinella nepalensis, Elymus scaber var. scaber* and *Poa sieberiana*. The graminoid *Lomandra longifolia* is common in some locations. Sedges include *Carex appressa, Carex incomitata and Cyperus vaginatus*. Ferns include *Cheilanthes sieberi, Adiantum aethiopicum, Doodia aspera and Pellaea nana*. Forbs include *Urtica incisa, Dichondra repens, Ranunculus lappaceus, Einadia hastata* and *Scutellaria humilis*.

Occurs on clay sand or sandy loam soils on riverine deposits on stream-banks and terrace flats of major rivers and creeks in low hills and hills landforms of Nandewar and Brigalow Belt South Bioregions. This community grades into PCT 78 River Red Gum along sections of the rivers. Varies in floristic composition with altitude and substrate with different species occurring on rocky substrates compared to deeper alluviums.

PCT 112: Black Tea-tree - River Oak - Wilga riparian low forest/shrubland wetland

PCT Name: Black Tea-tree - River Oak - Wilga riparian low forest/shrubland wetland of rich soil depressions in the Brigalow Belt South Bioregion

Vegetation Class: Inland Riverine Forests

EPBC Status: not listed

BC Status: not listed

Description on the property

The upper canopy of this PCT is sparse and dominated by *Melaleuca bracteata* (Melaleuca bracteata) and *Angophora floribunda* (Rough-barked Apple).

The mid layer is dominated by, *Notelaea microcarpa* (Native Olive) and *Angophora floribunda* (Rough-barked Apple). Other shrubs include *Melaleuca bracteata* (Black Tea-tree) *Melicytus dentatus* (Tree Violet), and *Acacia implexa* (Hickory Wattle).

The ground layer contains a cover of grasses such as *Oplismenus imbecillis, Oplismenus aemulus, Lachnagrostis filiformis, Microlaena stipoides* (Weeping Grass), *Chloris ventricosa* (Tall Chloris), *Anthosachne scabra* (Wheatgrass) and *Echinopogon ovatus* (Forest Hedgehog Grass). Other species include *Adiantum aethiopicum* (Common Maidenhair), *Geranium solanderi* (Native Geranium), *Clematis glycinoides* var. *glycinoides*, *Verbena bonariensis* (Purpletop) and *Nyssanthes diffusa* (Barbwire Weed)

BioNet Description

PCT 112 is typically low open forest or very tall shrubland dominated by *Melaleuca bracteata*. Other tree species include *Casuarina cunninghamiana, Angophora floribunda* and *Eucalyptus camaldulensis*. Shrubs are sparse and include *Geijera parviflora*, *Pimelea neo-anglica, Phyllanthus subcrenulatus, Breynia cernua, Dodonaea viscosa subsp. angustifolia, Pimelea curviflora var. curviflora, Psydrax oleifolia* and *Abutilon oxycarpum*. Vines include *Pandorea pandorana subsp. pandorana* or *Clematis microphylla var. leptophylla*. The ground cover contains the forbs *Urtica incisa, Persicaria decipiens, Plantago debilis, Wahlenbergia communis, Rorippa eustylis, Geranium solanderi var. solanderi, Hydrocotyle laxiflora, Wahlenbergia communis and Daucus glochidiatus*. Grasses include *Austrostipa verticillata, Lachnagrostis filiformis, Sporobolus creber, Ancistrachne uncinulata, Bothriochloa macra, Oplismenus aemulus, Cynodon dactylon and Leptochloa digitata*. Sedges include *Cyperus gracilis, Carex incomitata, Carex appressa, Cyperus gunnii, Cyperus vaginatus* and *Cyperus victoriensis*. Species of rush (Juncus) may also occur.

Occurs on alluvial deep, brown or black loam or clay soils, that are often saline, sometimes derived from a basalt substrate in depressions and lining watercourses in low hill and hill landform patterns extending to rocky creeks in places. Common in the Bellata region south-east of Moree, near Terry Hie Hie and east of Narrabri near Maules Creek and at the base of Mount Kaputar in the Brigalow Belt South Bioregion.

563: White Box - Silvertop Stringybark +/- White Cypress Pine grass shrub open forest

PCT Name: White Box - Silvertop Stringybark +/- White Cypress Pine grass shrub open forest of the southern Nandewar Bioregion and New England Tableland Bioregion

Vegetation Class: North-west Slopes Dry Sclerophyll Woodlands

EPBC Status: Does not conform to the description of a TEC.

BC Status: Does not conform to the description of a TEC.

Description on the Property

The canopy is dominated by *Eucalyptus albens* (White Box), *Angophora floribunda* (Rough-barked Apple), *Callitris glaucophylla* (White Cypress Pine), *Eucalyptus blakelyi* (Blakely's Red Gum), *Eucalyptus laevopinea* (Silver-top Stringybark) and *Eucalyptus melliodora* (Yellow Box).

There is a well-developed shrub layer which is dominated by *Notelaea microcarpa* (Native Olive), *Olearia elliptica* (Sticky Daisy-bush) as well as *Alectryon subdentatus f. subdentatus, Olearia viscidula* (Wallaby Weed). Pandorea pandorana (Wonga Wonga Vine) occurs in the upper and mid layers.

The ground layer consisted of *Poa sieberiana* (Snowgrass), *Dichondra* sp. Inglewood, *Vittadinia* spp. (Fuzzweed), *Geranium* spp., *Clematis glycinoides* (Headache Vine), *Glycine tabacina* (Variable Glycine), *Wahlenbergia communis* (Tufted Bluebell), *Sigesbeckia australiensis, Oxytes brachypoda* (Large Tick-trefoil) and *Geranium solanderi* (Native Geranium).

BioNet Description

PCT 563 is typically tall open forest with a variable overstorey dominated by *Eucalyptus albens, Eucalyptus laevopinea, Angophora floribunda, Callitris glaucophylla, Eucalyptus blakelyi* and/or *Eucalyptus melliodora*. There is a well developed shrub layer with *Olearia* sp. aff*. elliptica, Notelaea microcarpa var. microcarpa* and *Cassinia quinquefaria* the most frequent species, with other shrubs sometimes present including *Olearia viscidula, Dodonaea viscosa subsp. angustifolia, Acacia neriifolia, Melicytus dentatus*, and, rarely, *Olearia alpicola, Acacia maidenii* and *Pomaderris betulina subsp. betulina.* The climbers *Jasminum volubile* and *Pandorea jasminoides* are rarely present. The ground layer is usually sparse to mid-dense with common species including *Poa sieberiana, Desmodium brachypodum, Aristida ramosa* and *Dichondra repens.* Other frequent groundcover species include *Swainsona galegifolia, Austrodanthonia racemosa var. racemosa, Vittadinia cuneata, Themeda australis, Cheilanthes sieberi subsp. sieberi* and *Cymbopogon refractus.* Rarely recorded groundcover species include *Bulbine glauca* and *Swainsona brachycarpa.* This community is very poorly represented in the protected area network.

Occupies mid-elevation hilly areas, mainly in the southern parts of Nandewar south from near Watson's Creek, with small pockets east of Kaputar National Park and near Single National Park. It occurs on a variety of substrates including granite, sediments and volcanics.

PCT 588: White Box - White Cypress Pine shrubby hills open forest

PCT Name: White Box - White Cypress Pine shrubby hills open forest mainly in the Nandewar Bioregion

Vegetation Class: North-west Slopes Dry Sclerophyll Woodlands

EPBC Status: not listed

BC Status: not listed

Description on the Property
An open forest woodland on a hillslope, the canopy is dominated by *Callitris glaucophylla* (White Cypress Pine) and *Eucalyptus albens* (White Box).

The mid layer contains *Callitris glaucophylla* (White Cypress Pine), *Dodonaea viscosa* (Sticky Hop-bush), *Olearia elliptica* (Sticky Daisy-bush), *Acacia decora* (Western Silver Wattle) and *Notelaea microcarpa var. microcarpa* (Native Olive).

The ground layer is comprised of grasses and sedges such as *Austrostipa scabra* (Speargrass), and *Cyperus gracilis* (Slender Flat-sedge) occur in the plots. Forbs and vine species such as *Dichondra* sp. *Inglewood, Swainsona galegifolia* (Smooth Darling Pea), *Cheilanthes sieberi* subsp. *sieberi* (Rock Fern) and G*lycine tabacina* (Variable Glycine) are also scattered across the ground layer of the plots.

BioNet Description

PCT 588 is typically an open forest to woodland dominated by *Eucalyptus albens* and *Callitris glaucophylla* with a shrubby understorey. Other tree species include *Eucalyptus melliodora, Angophora floribunda, Eucalyptus dealbata* or *Eucalyptus melanophloia* may also occur. Contains

a mid-dense to sparse shrub layer including *Notelaea microcarpa var. microcarpa, Geijera parviflora, Beyeria viscosa, Olearia elliptica, Dodonaea viscosa subsp. angustifolia, Acacia decora, Bursaria spinosa var. spinosa, Psydrax odorata, Cassinia laevis* and *Olearia ramosissima*. There is usually a mid-dense ground cover of grass species such as *Aristida ramosa, Aristida vagans, Cymbopogon refractus, Austrostipa scabra, Elymus scaber* and *Dichelachne micrantha.* The sub-shrub *Desmodium brachypodum* and climber *Glycine tabacina* are often present. Forb species include *Rostellularia adscendens, Boerhavia repleta, Swainsona galegifolia, Swainsona queenslandica, Vittadinia muelleri, Galium propinquum* and *Dichondra sp. A.*

Occurs on brown to red clay to loam soils derived from lithic sandstones of finer sedimentary or metamorphic rocks mainly on lower-mid hillslopes in hill landform patterns in the Nandewar Bioregion including around Mount Kaputar extending to Manilla with some outliers in the BBS Bioregion on hills In the Liverpool Plains sub-region and areas to the north of Kaputar.

PCT 589 White Box - White Cypress Pine grassy woodland

PCT Name: White Box - White Cypress Pine - Silver-leaved Ironbark grassy woodland on mainly clay loam soils on hills mainly in the Nandewar Bioregion

Vegetation Class: North-west Slopes Dry Sclerophyll Woodlands

EPBC Status: Does not conform to the description of a TEC

BC Status: Does not conform to the description of a TEC

Description on the Property
An open forest woodland on a hillslope, the canopy is dominated by *Eucalyptus albens* (White Box), *Eucalyptus crebra* (Narrow-leaved Ironbark and *Callitris glaucophylla* (White Cypress Pine).

The mid layer contains *Callitris glaucophylla* (White Cypress Pine), *Dodonaea viscosa* (Sticky Hop-bush), *Olearia elliptica* (Sticky Daisy-bush), *Acacia decora* (Western Silver Wattle) and *Notelaea microcarpa* var. *microcarpa* (Native Olive), Dodonaea viscosa (Sticky Hop-bush), *Cassinia laevis* (Cough Bush), *Olearia elliptica* (Sticky Daisy-bush) and *Pimelea neo-anglica* (Poison Pimelea).

The ground layer is comprised of grasses and sedges such as *Austrostipa scabra* (Speargrass), *Paspalidium gracile* (Slender Panic), *Austrostipa scabra* (Speargrass), *Aristida ramosa* (Purple Wiregrass), *Cymbopogon refractus* (Barbed Wire Grass) and *Cyperus gracilis* (Slender Flat-sedge) occur in the plots. Forbs and vine species such as *Dichondra* sp. Inglewood, *Swainsona galegifolia* (Smooth Darling Pea), *Cheilanthes sieberi* subsp. *sieberi* (Rock Fern) and *Glycine tabacina* (Variable Glycine) are also scattered across the ground layer of the plots.

BioNet Description

PCT 588 is typically an open forest to woodland dominated by *Eucalyptus albens* and *Callitris glaucophylla* with a shrubby understorey. Other tree species include *Eucalyptus melliodora*, *Angophora floribunda*, *Eucalyptus dealbata* or *Eucalyptus melanophloia* may also occur. Contains a mid-dense to sparse shrub layer including *Notelaea microcarpa* var. *microcarpa*, *Geijera parviflora*, *Beyeria viscosa*, Olearia elliptica, *Dodonaea viscosa* subsp. *angustifolia*, *Acacia decora*, *Bursaria spinosa* var. *spinosa*, *Psydrax odorata*, *Cassinia* laevis and *Olearia ramosissima*. There is usually a mid-dense ground cover of grass species such as *Aristida ramosa*, *Aristida vagans*, *Cymbopogon refractus*, *Austrostipa scabra*, *Elymus scaber* and *Dichelachne micrantha*. The sub-shrub *Desmodium brachypodum* and climber *Glycine tabacina* are often present. Forb species include *Rostellularia adscendens*, *Boerhavia repleta*, *Swainsona galegifolia*, *Swainsona queenslandica*, *Vittadinia muelleri*, *Galium propinquum* and *Dichondra* sp. A.

Occurs on brown to red clay to loam soils derived from lithic sandstones of finer sedimentary or metamorphic rocks mainly on lower-mid hillslopes in hill landform patterns in the Nandewar Bioregion including around Mount Kaputar extending to Manilla with some outliers in the BBS Bioregion on hills In the Liverpool Plains sub-region and areas to the north of Kaputar.

PCT 592: Narrow-leaved Ironbark - cypress pine - White Box shrubby open forest

PCT Name: Narrow-leaved Ironbark - cypress pine - White Box shrubby open forest in the Brigalow Belt South Bioregion and Nandewar Bioregion

Vegetation Class: Western Slopes Dry Sclerophyll Forests

EPBC Status: not listed

BC Status: not listed

Description on the Property

The canopy dominated by *Eucalyptus crebra* (Narrow-leaved Ironbark), *Eucalyptus albens* (White Box) and *Callitris glaucophylla* (White Cypress Pine).

The mid layer is comprised of *Beyeria viscosa* (Sticky Wallaby Bush), *Dodonaea viscosa* (Sticky Hop-bush), *Callitris glaucophylla* (White Cypress Pine), *Olearia elliptica* (Sticky Daisy-bush), *Notelaea microcarpa* (Native Olive),

Other species include *Cassinia quinquefaria* and *Cassinia laevis* (Cough Bush) and *Acacia decora* (Western Silver Wattle).

The ground layer consists of grasses *Austrostipa scabra* (Speargrass), *Cyperus gracilis* (Slender Flat-sedge) and *Cymbopogon refractus* (Barbed Wire Grass). *Glycine tabacina* (Variable Glycine), *Oxytes brachypoda* (Large Tick-trefoil), and *Dichondra* sp. *Inglewood* and also occur in the ground layer. Other species observed were *Eragrostis leptostachya* (Paddock Lovegrass), *Panicum effusum* (Hairy Panic), *Aristida acuta, Sorghum leiocladum* (Wild Sorghum), *Dichanthium sericeum* (Queensland Bluegrass), *Calotis lappulacea* (Yellow Burr-daisy).

BioNet Description

PCT 592 is typically a tall or mid-high open forest to woodland dominated by *Eucalyptus crebra, Callitris glaucophylla* and/or *Eucalyptus albens.* Other trees may include *Eucalyptus dealbata* or *Eucalyptus melanophloia*. There is usually a sparse shrubby understorey with *Beyeria viscosa, Notelaea microcarpa var. microcarpa* and *Dodonaea viscosa subsp. angustifolia* most frequent. Other shrubs include *Breynia cernua, Solanum parvifolium, Melichrus urceolatus, Spartothamnella juncea* and *Psydrax oleifolia*. The ground layer includes the sub-shrub *Desmodium brachypodum* and grass species such as *Austrostipa scabra subsp. scabra, Austrodanthonia racemosa var. obtusata, Microlaena stipoides var. stipoides, Aristida ramosa* and *Cymbopogon refractus*. Forb species include *Dichondra species A, Calotis anthemoides, Vernonia cinerea var. cinerea, Brunoniella australis* and *Arthropodium sp. B.* Climbers include *Desmodium varians* and *Glycine clandestina.*

Occurs in loamy soils derived from volcanic or sedimentary substrates on hillslopes, footslopes and flats in hill landscape patterns mainly in the Mount Kaputar to Keepit Dam regions with outliers to the east and south of Mount Kaputar.

PCT 594 White Box - White Cypress Pine - Silver-leaved Ironbark grassy woodland

PCT Name: White Box - White Cypress Pine - Silver-leaved Ironbark grassy woodland on mainly clay loam soils on hills mainly in the Nandewar Bioregion

Vegetation Class: Western Slopes Grassy Woodlands

EPBC Status: Does not conform to TEC

BC Status: Does not conform to TEC

Description on Property

In this PCT, the canopy is dominated by *Callitris glaucophylla* (White Cypress Pine), *Eucalyptus albens* (White Box), *Angophora floribunda* (Rough-barked Apple) and Eucalyptus crebra (Narrow-

leaved Ironbark). Other tree species included in the plots were *Eucalyptus melanophloia* (Silver-leaved Ironbark), *Eucalyptus sideroxylon* (Mugga Ironbark) and *Eucalyptus dealbata* (Tumbledown Red Gum).

The mid layer consists of regeneration of *Callitris glaucophylla* (White Cypress Pine), *Eucalyptus albens* (White Box), *Eucalyptus albens* (White Box) and *Angophora floribunda* (Rough-barked Apple). Shrub species include *Notelaea microcarpa* (Native Olive), *Cassinia quinquefaria* and *Olearia elliptica* (Sticky Daisy-bush).

The ground layer consists of grass species *Aristida ramosa* (Purple Wiregrass), *Cymbopogon refractus* (Barbed Wire Grass), *Cyperus gracilis* (Slender Flat sedge). Forb species include *Oxytes brachypoda* (Large Tick-trefoil), *Dichondra* sp. *Inglewood*, and *Cheilanthes sieberi* (Rock Fern). Species such as *Digitaria diffusa* (Open Summer-grass) and *Melichrus urceolatus* (Urn Heath), *Enneapogon gracilis* (Slender Nineawn), *Phyllanthus subcrenulatus* and *Panicum effusum* (Hairy Panic) were also present in the ground layer of the plots.

BioNet Description

PCT 594 is typically a mid-high to tall open forest or woodland or dominated by *Callitris glaucophylla* (White Cypress Pine) and *Eucalyptus melanophloia* (Silver-leaved Ironbark) with other trees including *Eucalyptus dealbata* (Tumbledown Red Gum), *Eucalyptus albens* (White Box), *Eucalyptus crebra* (Narrow leaved Ironbark) or *Angophora floribunda* (Rough-barked Apple). The shrub layer is often mid-dense and includes Notelaea microcarpa var. microcarpa, Olearia elliptica, Cassinia quinquefaria, Pimelea neo-anglica, Geijera parviflora and Melichrus urceolatus. The ground layer is sparse and includes *Desmodium brachypodum,* the grasses *Cymbopogon refractus, Aristida ramosa, Themeda australis and Austrostipa scabra* subsp*. scabra* and the sedge *Cyperus gracilis*. Forb species include *Dichondra* species A*, Oxalis perennans, Wurmbea dioica* subsp*. dioica, Cymbonotus lawsonianus, Chrysocephalum apiculatum* and *Chrysocephalum semipapposum*. Occurs on shallow red to brown sandy loam clay soils derived from a variety of sedimentary and volcanic substrates, widespread in low hill or hill landform patterns at low to intermediate altitudes mainly in the central to northern parts of the Nandewar and BBS Bioregions with minor occurrences in forests on the Liverpool Plains.

PCT 1308: White Box - White Cypress Pine shrubby open forest

PCT Name: White Box - White Cypress Pine shrubby open forest of the Nandewar Bioregion and Brigalow Belt South Bioregion

Vegetation Class: North-west Slopes Dry Sclerophyll Woodlands

EPBC Status: not listed

BC Status: not listed

Description on the Property

This PCT occurs as an open forest, with a canopy dominated by *Eucalyptus albens* (White Box), *Callitris glaucophylla* (White Cypress Pine), *Angophora floribunda* (Rough-barked Apple), and *Eucalyptus melanophloia* (Silver-leaved Ironbark).

The mid layer is comprised of regeneration of *Callitris glaucophylla* (White Cypress Pine), *Eucalyptus albens* (White Box), *Eucalyptus melanophloia* (Silver-leaved Ironbark), plus *Dodonaea viscosa* (Sticky Hop-bush), *Olearia elliptica* (Sticky Daisy-bush), and *Cassinia quinquefaria*. Other species include *Verbascum thapsus* subsp. *Thapsus* (Great Mullein) and *Cassinia laevis* (Cough Bush).

The ground layer is comprised of *Cymbopogon refractus* (Barbed Wire Grass), as well as *Dichanthium sericeum* (Queensland Bluegrass), *Bothriochloa macra* (Red Grass), *Microlaena stipoides* (Weeping Grass), *Sporobolus creber* (Slender Rat's Tail Grass) and *Haloragis heterophylla* (Variable Raspwort).

BioNet Description

PCT 1308 is typically a tall open forest or woodland dominated by *Eucalyptus albens, Callitris glaucophylla, Angophora floribunda, Brachychiton populneus subsp. Populneus, Eucalyptus melliodora, Eucalyptus dealbata, Eucalyptus crebra* and *Eucalyptus melanophloia.* The shrub layer is often (what density) and includes *Beyeria viscosa, Bursaria spinosa subsp. Spinosa, Cassinia quinquefaria, Dodonaea viscosa subsp. Angustifolia, Notelaea microcarpa var. Microcarpa,* and *Olearia elliptica.* The ground layer is often (unknown density) and frequent ground cover species include *Aristida ramosa, Cheilanthes sieberi subsp. Sieberi, Cymbopogon refractus* and *Desmodium brachypodum.*

PCT 1383: White Box grassy woodland

PCT Name: White Box grassy woodland of the Nandewar Bioregion and Brigalow Belt South Bioregion

Vegetation Class: Western Slopes Grassy Woodlands

EPBC Status: Critically endangered: White Box-Yellow Box-Blakely's Red Gum Grassy Woodland and Derived Native Grassland, wholly subset of TEC.

BC Status: Critically endangered (part): White Box-Yellow Box-Blakely's Red Gum Grassy Woodland and Derived Native Grassland, wholly subset of TEC.

Description on the Property

In this PCT, the canopy is dominated by *Callitris glaucophylla* (White Cypress Pine), *Eucalyptus albens* (White Box), *Brachychiton populneus* (Kurrajong) and *Angophora floribunda* (Rough-barked Apple). Other tree species included in the plots were *Acacia salicina* (Cooba) and Eucalyptus crebra (Narrow-leaved Ironbark). Other species include *Amyema miquelii* (Box Mistletoe).

The mid layer consists of regeneration of *Callitris glaucophylla* (White Cypress Pine), *Eucalyptus albens* (White Box), *Eucalyptus albens* (White Box) and *Acacia salicina* (Cooba) and *Acacia implexa* (Hickory Wattle).

Shrub species include *Notelaea microcarpa* (Native Olive), *Olearia elliptica* (Sticky Daisy-bush) and *Notelaea microcarpa* (Native Olive).

The ground layer consists of *Dichanthium sericeum* (Queensland Bluegrass), *Cyperus gracilis* (Slender Flat-sedge), *Glycine tabacina* (Variable Glycine), *Aristida ramosa* (Purple Wiregrass) *Cymbopogon refractus* (Barbed Wire Grass) and *Oxytes brachypoda* (Large Tick-trefoil). Other species include *Sporobolus creber* (Slender Rat's Tail Grass), *Panicum effusum* (Hairy Panic), *Poa labillardierei* var. *labillardierei* (Tussock), *Chloris ventricosa* (Tall Chloris),

BioNet Description

PCT 1383 is typically a tall grassy woodland dominated by *Eucalyptus albens, Angophora floribunda, Brachychiton populneus* subsp. *Populneus, Callitris glaucophylla, Eucalyptus laevopinea, Eucalyptus melanophloia, Eucalyptus melliodora* and *Eucalyptus pilligaensis*. It has a (density unknown) sparse shrub layer of *Acacia buxifolia, Acacia implexa, Alectryon oleifolius subsp. Canescens, Alstonia constricta, Beyeria viscosa, Cassinia laevis, Geijera parviflora, Notelaea microcarpa* var. *microcarpa* and *Olearia elliptica*. Ground cover is (unknown density) and frequent species are *Aristida ramosa, Austrostipa scabra* subsp. *Scabra, Cymbopogon refractus, Cyperus gracilis, Desmodium brachypodum, Dichanthium sericeum* subsp. *Sericeum, Glycine tabacina* and *Themeda australis*. Occurs on creek flats, lower slopes and alluvial plains mainly on sedimentary substrates**.**

4.1.1 Threatened plants

No threatened plants listed in the schedules of the TSC Act or EPBC Act, were recorded on the Willeroi West Offset property.

4.1.2 Threatened Ecological Communities

The TECs that occur on the Willeroi West offset area are listed in Table 4.2 and shown on Figure 4.2.

Table 4.2 Threatened Ecological Communities listed for Willeroi East

Threatened Ecological Communities	Plant Community Type	West Willeroi
White Box Yellow Box Blakely's Red Gum Woodland (Woodland Form)	1383: White Box grassy woodland	54.32
White Box Yellow Box Blakely's Red Gum Woodland (Grassland Form)	1383: Derived Native Grassland	227.48
Total White Box Yellow Box Blakely's Red Gum Woodland CEEC		**281.80**

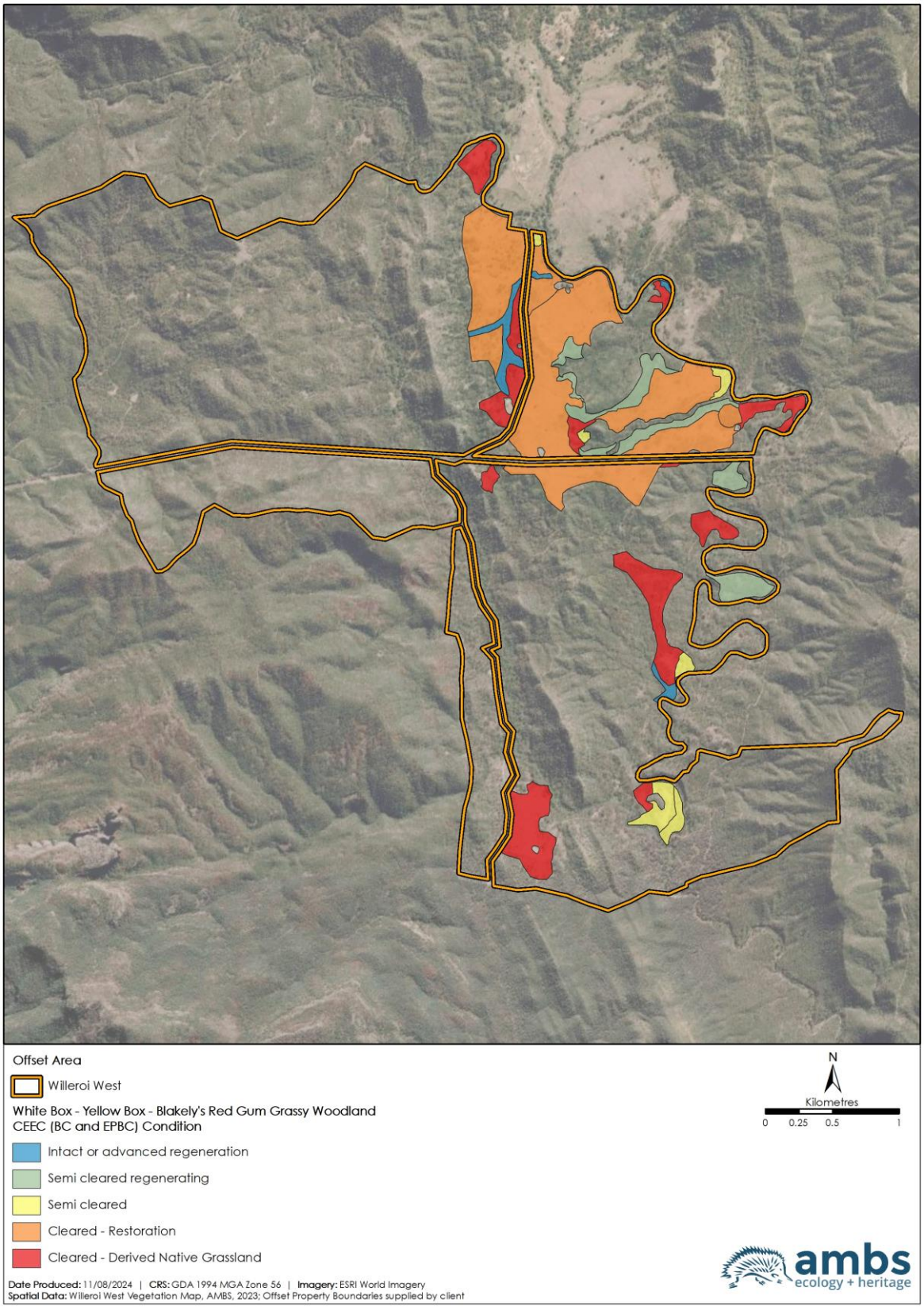


Figure 4.2 Threatened Ecological Communities that occur on the Willeroi West Offset

4.2 Description of revised BOS values - Fauna

The fauna habitat values of the original Tarrawonga BOS, as identified in NSW Project Approval 11_0047 and EPBC Approval 2011/5923, and how they have been met by the Willeroi West offset property are shown in Table 4.3.

For each species, woodland forms of each PCT (Intact or advanced regeneration, Semi-cleared, semi-cleared regeneration) were considered as Existing Potential Habitat. Areas of DNG were classified as Future Potential Habitat.

Table 4.3: Fauna habitat values for the revised Vickery BOS

Species	Area
Regent Honeyeater	1,385.67
Swift Parrot	1,335.32
Corben's Long-eared Bat	1,356.90

For the Willeroi East offset area, the following PCTs were determined to be suitable for the Regent Honeyeater (Figure 4.3):

- 84: River Oak - Rough-barked Apple - Red Gum - box riparian tall woodland (wetland) of the Brigalow Belt South Bioregion and Nandewar Bioregion;
- 563: White Box - Silvertop Stringybark +/- White Cypress Pine grass shrub open forest of the southern Nandewar Bioregion and New England Tableland Bioregion;
- 588: White Box - White Cypress Pine shrubby hills open forest mainly in the Nandewar Bioregion;
- 589: White Box - White Cypress Pine - Silver-leaved Ironbark grassy woodland on mainly clay loam soils on hills mainly in the Nandewar Bioregion;
- 592: Narrow-leaved Ironbark - cypress pine - White Box shrubby open forest in the Brigalow Belt South Bioregion and Nandewar Bioregion;
- 594: White Box - White Cypress Pine - Silver-leaved Ironbark grassy woodland on mainly clay loam soils on hills mainly in the Nandewar Bioregion;
- 1308: White Box - White Cypress Pine shrubby open forest of the Nandewar Bioregion and Brigalow Belt South Bioregion; and,
- 1383: White Box grassy woodland of the Nandewar Bioregion and Brigalow Belt South Bioregion.

For the Willeroi West offset area, the following PCTs were considered to be suitable for the Swift Parrot (Figure 4.4):

- 84: River Oak - Rough-barked Apple - red gum - box riparian tall woodland;
- 588: White Box - White Cypress Pine shrubby hills open forest mainly in the Nandewar Bioregion;
- 589: White Box - White Cypress Pine - Silver-leaved Ironbark grassy woodland on mainly clay loam soils on hills mainly in the Nandewar Bioregion;
- 592: Narrow-leaved Ironbark - cypress pine - White Box shrubby open forest in the Brigalow Belt South Bioregion and Nandewar Bioregion;
- 594: White Box - White Cypress Pine - Silver-leaved Ironbark grassy woodland on mainly clay loam soils on hills mainly in the Nandewar Bioregion;
- 1308: White Box - White Cypress Pine shrubby open forest of the Nandewar Bioregion and Brigalow Belt South Bioregion; and,
- 1383: White Box grassy woodland of the Nandewar Bioregion and Brigalow Belt South Bioregion.

AMBS also notes that Swift Parrots were detected foraging on the property in 2019 (AMBS 2020b) and were detected foraging on an adjacent property (Wirradale) in 2018 (AMBS 2019b).

For the Willeroi West offset area, the following PCTs were considered to be suitable for Corben's Long-eared Bat (Figure 4.5):

- 84: River Oak - Rough-barked Apple - red gum - box riparian tall woodland;
- 112: Black Tea-tree - River Oak - Wilga riparian low forest/shrubland wetland of rich soil depressions in the Brigalow Belt South Bioregion;
- 588: White Box - White Cypress Pine shrubby hills open forest mainly in the Nandewar Bioregion;
- 589: White Box - White Cypress Pine - Silver-leaved Ironbark grassy woodland on mainly clay loam soils on hills mainly in the Nandewar Bioregion;
- 592: Narrow-leaved Ironbark - cypress pine - White Box shrubby open forest in the Brigalow Belt South Bioregion and Nandewar Bioregion;
- 594: White Box - White Cypress Pine - Silver-leaved Ironbark grassy woodland on mainly clay loam soils on hills mainly in the Nandewar Bioregion;
- 1308: White Box - White Cypress Pine shrubby open forest of the Nandewar Bioregion and Brigalow Belt South Bioregion; and,
- 1383: White Box grassy woodland of the Nandewar Bioregion and Brigalow Belt South Bioregion.

AMBS notes that the species has been regularly trapped on the Willeroi West property during annual harp trap programs (AMBS 2018, 2019a, 2020a, 2023).

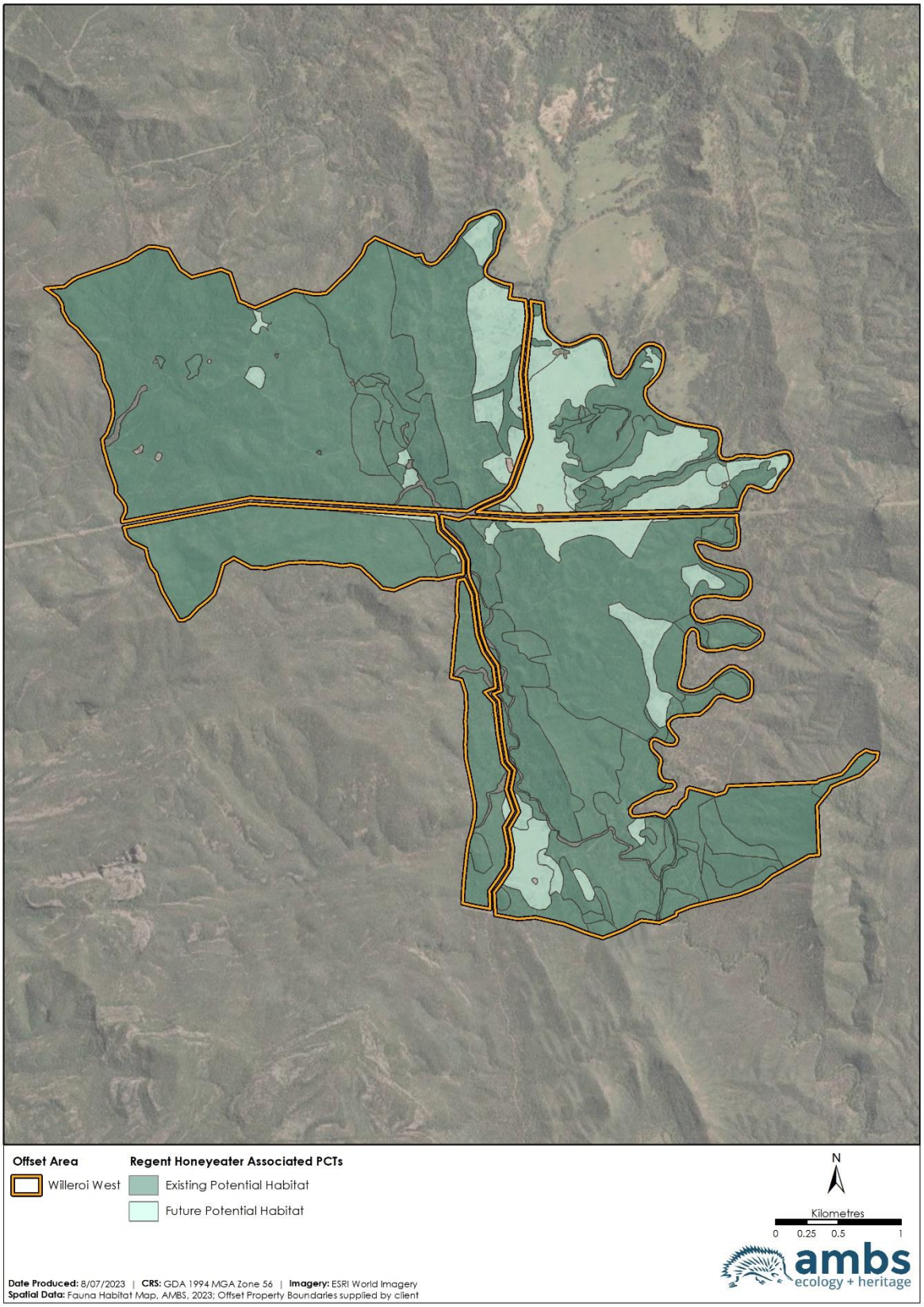


Figure 4.3: Regent Honeyeater existing potential habitat and future potential habitat

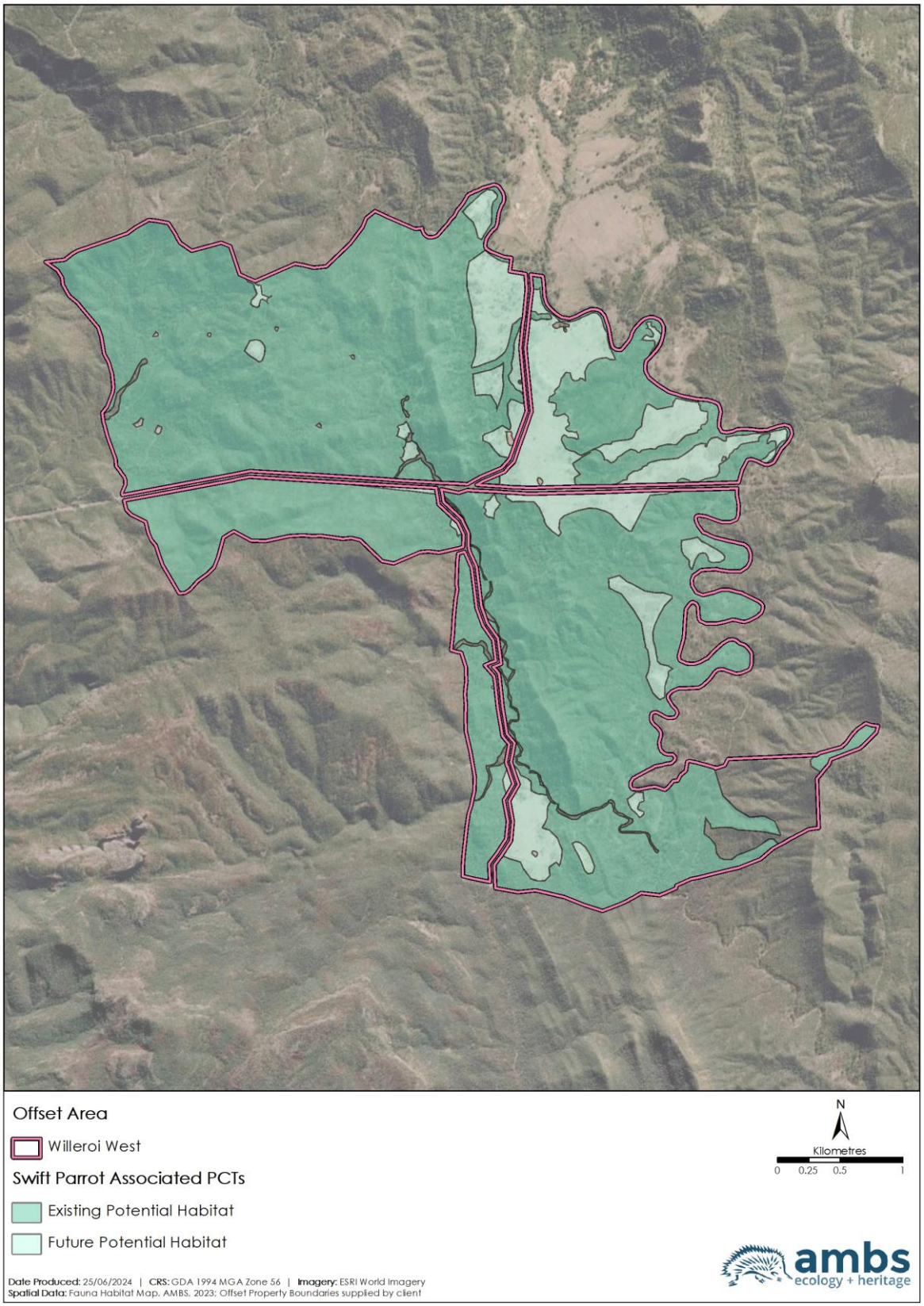


Figure 4.4: Swift Parrot existing potential habitat and future potential habitat

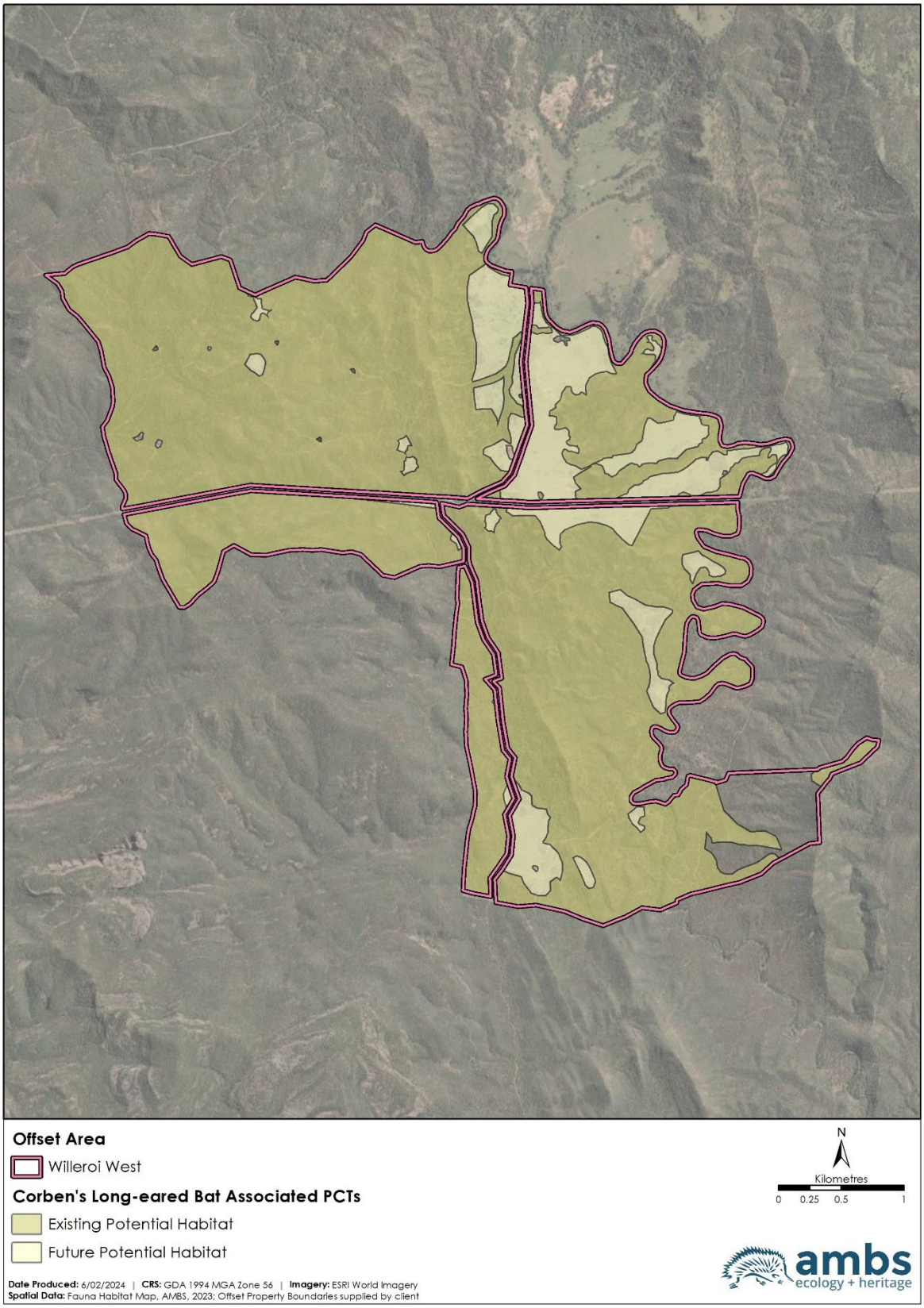


Figure 4.5: Corben's Long-eared Bat existing potential habitat and future potential habitat

5 Summary of findings

The following section provides a comparative summary of the original BOS to those of proposed RBOS.

5.1 Plant Community Types

A comparison between the BOS and the RBOS shows variation between the vegetation types mapped (Table 5.2). An exact match was not achieved for all original Biometric Vegetation Types [BVT] (DPIE 2017). When this occurred, the best fit was matched to a current PCT. Totals for native vegetation and vegetation types will vary due to changes on boundaries to mapping polygons, changes to vegetation condition over time and realignment of the Willeroi Offset property boundary. Following the high accuracy cadastral survey; to ensure the Willeroi West Offset Area achieved the minimum 1,660 ha required in PA11_0047; the offset area boundary incorporated additional areas of vegetation previously assigned to the adjacent Willeroi East Offset Area but approved to be removed (and thus available to incorporated into Willeroi West Offset Area) as part of the Vickery Revised Biodiversity Offset Strategy (AMBS, 2024) approved on 13 March 2024.

While there is variation; overall this RBOS meets the biodiversity value requirements as per the Tarrawonga Coal Mine Approvals (PA 11_0047 & EPBC 2011/5923) relating to TECs and threatened fauna habitat, and the extent of offset area and area required for “enhanced with the restoration” (i.e. revegetation and habitat augmentation).

5.2 Threatened Ecological Communities

The RBOS will result in an increase in the area of TECs within the offsets (Table 5.1). There will be an overall increase of 49.8 ha of TECs due to the revisions made as a result of the high accuracy of spatial data delineating the cadastral boundaries of the properties surveyed, and the application of contemporary vegetation community mapping standards.

Table 5.1 Summary table Willeroi West previous and revised TEC areas

Threatened Ecological community	Original BOS Area (ha)	Revised BOS Area (ha)	Difference (ha)
White Box Yellow Box Blakely’s Red Gum Woodland	232	281.80	49.8

5.3 Threatened plants

There will be no change to the status of the threatened plants (none) recorded on the Willeroi West offset property as a result of this RBOS.

Table 5.2 Vegetation communities recorded in the original BOS and RBOS and the area of each

Vegetation Class (Keith 2006)	Current PCT	Equivalent BVT (Eco Logical 2013)	Original BOS	Revised BOS	Comment on Change
Eastern Riverine Forests	84: River Oak - Rough-barked Apple - red gum - box riparian tall woodland	NA191 River Oak riparian woodland of the Brigalow Belt South and Nandewar Bioregions (Benson 84); NA197 Rough-barked Apple riparian forb/grass open forest of the Nandewar Bioregion	DNG – 11.5 Forest – 135.72	35.14	Portions of NA197 and NA191 were re assigned to the Willeroi East Offset Property due to offset boundary realignment, thus reducing the area for these PCTs in Willeroi West
Inland Riverine Forests	112: Black Tea-tree - River Oak - Wilga riparian low forest/shrubland wetland	NA191 River Oak riparian woodland of the Brigalow Belt South and Nandewar Bioregions (Benson 84)	27.23	21.58	Slight decrease in area
North-west Slopes Dry Sclerophyll Woodlands	563: White Box - Silvertop Stringybark +/- White Cypress Pine grass shrub open forest	No equivalent recorded		50.36	Realignment of offset property boundary resulted in the inclusion of a new PCT not recorded within the old boundary for Willeroi West.
Western Slopes Dry Sclerophyll Forests	592: Narrow-leaved Ironbark - cypress pine - White Box shrubby open forest	NA228 White Cypress Pine - Narrow-leaved Ironbark shrub/grass open forest of the western Nandewar Bioregion	485.1	479.75	Slight decrease in area
Western Slopes Dry Sclerophyll Forests	592: Derived Native Grassland	NA228 White Cypress Pine - Narrow-leaved Ironbark shrub/grass open forest of the western Nandewar Bioregion	81.96	6.93	Area of DNG reduced due to offset property boundary realignment
North-west Slopes Dry Sclerophyll Woodlands	589: White Box - White Cypress Pine - Silver-leaved Ironbark grassy woodland	NA232 White Cypress Pine - White Box - Silver-leaved Ironbark shrubby open forest of the Nandewar Bioregion	157.14	55.13	NA232 represented by two PCTs 589 and 594. Total area increased.
Western Slopes Grassy Woodlands	594: Silver-leaved Ironbark - White Cypress Pine shrubby open forest	NA232 White Cypress Pine - White Box - Silver-leaved Ironbark shrubby open forest of the Nandewar Bioregion		169.10	

Vegetation Class (Keith 2006)	Current PCT	Equivalent BVT (Eco Logical 2013)	Original BOS	Revised BOS	Comment on Change
Western Slopes Grassy Woodlands	594: Derived Native Grassland	NA232 White Cypress Pine - White Box - Silver-leaved Ironbark shrubby open forest of the Nandewar Bioregion	33.58	8.03	Area of DNG reduced due to offset property boundary realignment
North-west Slopes Dry Sclerophyll Woodlands	588: White Box - White Cypress Pine shrubby hills open forest	NA225 White Box White Cypress Pine shrubby open forest of the Nandewar and Brigalow Belt south bioregions	143.34	51.23	NA225 in some locations equivalent to PCT 588.
North-west Slopes Dry Sclerophyll Woodlands	1308: White Box - White Cypress Pine shrubby open forest	NA225 White Box White Cypress Pine shrubby open forest of the Nandewar and Brigalow Belt south bioregions		472.60	Overall increase in area of NA225.
North-west Slopes Dry Sclerophyll Woodlands	1308: Derived Native Grassland	NA225 White Box White Cypress Pine shrubby open forest of the Nandewar and Brigalow Belt south bioregions	237.77	4.62	Area of DNG reduced due to offset property boundary realignment
Western Slopes Grassy Woodlands	1383: White Box grassy woodland	NA237 Yellow Box - Blakely's Red Gum grassy woodland of the Nandewar Bioregion; NA226 White Box grassy woodland of the Nandewar and Brigalow Belt South Bioregions	37.34	72.37	Increase in total area. 281.80 ha of this PCT represents Box Gum Grassy Woodland TEC.
Western Slopes Grassy Woodlands	1383: Derived Native Grassland	NA237 Yellow Box - Blakely's Red Gum grassy woodland of the Nandewar Bioregion; NA226 White Box grassy woodland of the Nandewar and Brigalow Belt South Bioregions	195.2	229.31	
	Total Native Vegetation		**1,545.88**	**1,656.15**	

5.4 Fauna

WHC's RBOS for the Tarrawonga Coal Mine recognises that the existing requirements to offset impacts to Regent Honeyeater, Swift Parrot and Corben's Long-eared Bat as described in EPBC Approval 2011/5923; can be achieved using the habitat values identified on Willeroi West property (Table 5.3). The habitat values for Regent Honeyeater, Swift Parrot and Corben's Long-eared Bat identified on Willeroi West property are further enhanced by its connectivity to similar habitats on Willeroi East and onto Mount Kaputar National Park. Both the Swift Parrot and Corben's Long-eared Bat have been detected on the Willeroi West property.

In summary the habitat areas identified contain 1,385.67 ha of potential Regent Honeyeater (*Anthochaera phrygia*) habitat (greater than the minimum 1,055 ha) and 1,335.32 ha of potential Swift Parrot (*Phascolarctos cinereus*) habitat (greater than the minimum 397 ha), and 1,356.90 ha of potential Corben's Long-eared Bat habitat (greater than the minimum 1,355 ha) as required under Condition 6 of the EPBC Approval 2011/5923 (Table 5.3).

Table 5.3 PCTs providing existing potential habitat for the Regent Honeyeater, Swift Parrot and Corben's Long-eared Bat in Willeroi West property.

PCT ID	PCT Name	Regent Honeyeater Existing Potential Habitat (ha)	Swift Parrot Existing Potential Habitat (ha)	Corbens Long-eared Bat Existing Potential Habitat (ha)
84	River Oak - Rough-barked Apple - red gum - box riparian tall woodland	35.14	35.14	35.14
112	Black Tea-tree - River Oak - Wilga riparian low forest/shrubland wetland			21.58
563	White Box - Silvertop Stringybark +/- White Cypress Pine grass shrub open forest	50.36		
588	White Box - White Cypress Pine shrubby hills open forest	51.23	51.23	51.23
589	White Box - White Cypress Pine - Silver-leaved Ironbark grassy woodland	55.13	55.13	55.13
592	Narrow-leaved Ironbark - cypress pine - White Box shrubby open forest	479.75	479.75	479.75
594	Silver-leaved Ironbark - White Cypress Pine shrubby open forest	169.10	169.10	169.10
1308	White Box - White Cypress Pine shrubby open forest	472.60	472.60	472.60
1383	White Box grassy woodland	72.37	72.37	72.37
Total		**1,385.67**	**1,335.32**	**1,356.90**

5.5 Consultation

This RBOS was submitted for review to the North West - Biodiversity, Conservation & Science, Department of Climate Change, Energy, the Environment and Water who found that the property, Willeroi West, has been secured via conservation agreement (CA0060). BCS understands that the BOS has been revised to:

- Reflect boundary changes resulting from detailed cadastral surveys conducted for the conservation agreement.
- Update vegetation mapping from regional biodiversity vegetation types to plant community types.

The changes are consistent with the requirements of development consent MP11_0047 and the Commonwealth approval 2011/5923. Given this, BCS has no specific comment to make on the BOS. (Appendix A).

6 Conclusions

This RBOS does not alter or vary exiting BOS commitments as described in NSW Project Approval 11_0047 and Commonwealth EPBC Approval 2011/5923. All commitments are maintained or exceeded (Table 6.1)

This RBOS does not alter or vary the commitment as described in the original BOS (NSW Approval 11_0047 Condition 40) for a Rehabilitation Area as part of the Offset package. This RBOS only addresses the external land based components of the Tarrawonga BOS; and as such the description and implementation of the Rehabilitation Area offset (752 ha of native woodland vegetation communities to be re-established, focused on Box Gum Woodland EEC) is documented in the Tarrawonga Coal Mines' future TCM Rehabilitation Management Plan (currently Whitehaven 2022a).

Table 6.1 Summary of requirements of NSW Project Approval 11_0047 and EPBC Approval 2011/5923 and how they have been met

Biodiversity Offset Strategy Criteria (PA11_0047 and/or EPBC 2011/5923)	Required Quantum for Biodiversity Offset Strategy (ha)	Quantum in Revised Biodiversity Offset Strategy (ha)	Difference (Revised BOS – Required BOS) (ha)
Minimum Area	1,660	1,660.03*	+0.03
Area of Box Gum Woodland CEEC (2011/5923)	232	281.80	+49.8
Box Gum Woodland CEEC (11_0047)	193	281.80	+88.8
Potential Regent Honeyeater Habitat (2011/5923)	1,055	1,385.67	+330.67
Potential Swift Parrot (2011/5923) Habitat	397	1,335.32	+938.32
Potential Habitat Corben's Long-eared Bat (2011/5923)	1,355	1,356.90	+1.9

* includes 14 dams and associated infrastructure (3.88 ha)

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Appendix A: Response to RBOS from North West - Biodiversity, Conservation & Science, Department of Climate Change, Energy.

Department of Climate Change, Energy, the Environment and Water

Our ref: DOC24/618746
Your ref: MP11_0047

Ms Belinda Pellow
Executive Advisor
ambs ecology + heritage
E-mail: belindap@ambs.com.au

Dear Ms Pellow

Tarrawonga coal mine – revised biodiversity offset strategy

Thank you for your e-mail dated 16 July 2024 to the Biodiversity, Conservation and Science Directorate (BCS) of the NSW Department of Climate Change, Energy, the Environment and Water (NSW DCCEEW) inviting comments on the revised biodiversity offset strategy (BOS) for Tarrawonga coal mine.

The property, Willeroi West, has been secured via conservation agreement (CA0060). BCS understands that the BOS has been revised to:

- Reflect boundary changes resulting from detailed cadastral surveys conducted for the conservation agreement.
- Update vegetation mapping from regional biodiversity vegetation types to plant community types.

The changes are consistent with the requirements of development consent MP11_0047 and the Commonwealth approval 2011/5923. Given this, BCS has no specific comment to make on the BOS.

If you have any questions about this advice, please do not hesitate to contact Liz Mazzer, Senior Conservation Planning Officer, via liz.mazzer@environment.nsw.gov.au or (02) 6883 5325.

Yours sincerely

Calvin Houlison
Senior Team Leader Planning North West
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